City West Water

Drinking Water Quality Report 2012

Glossary of terms

ADWG 2004	*Australian Drinking Water Guidelines (2004)*. Published by the National Health and Medical Research Council of Australia
ADWG 2011	*Australian Drinking Water Guidelines (2011)*. Published by the National Health and Medical Research Council of Australia
E. coli	*Escherichia coli*, a bacterium which is considered to indicate the presence of faecal contamination and therefore health risk
HACCP	Hazard Analysis and Critical Control Points certification for protecting drinking water quality
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
orgs/100mL	Organisms per 100 millilitres
UCL	Upper confidence limit
<	“Less than” symbol
>	“Greater than” symbol

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From our Managing Director

Welcome to City West Water's 2012 Annual Drinking Water Quality Report which provides comprehensive information on the quality of the drinking water supply throughout the inner and western suburbs of Melbourne, as well as the central business district. It also describes water sources, management practices and related events that took place between July 2011 and June 2012.

The provision of safe drinking water in Victoria is regulated under the *Safe Drinking Water Act 2003*, which sets drinking water quality standards, as well as public disclosure and reporting requirements. Management of water quality under the Act is overseen and assessed by Victoria's Department of Health.

Throughout 2011-12, we collected and tested over 3600 water samples, almost all of which were obtained from the point of supply to customers' premises using special tap fittings adjacent to property water meters. Test results demonstrated that the quality of our drinking water supply was superior to that specified in the regulated quality standards and Australian Drinking Water Guidelines.

Besides continuing the tradition of again demonstrating to customers the high quality of our drinking water supply, some of the highlights for 2011-12 include:

- retained compliance of our Risk Management Plan with respect to the *Safe Drinking Water Act 2003*
- retained certification of our HACCP plan for water quality
- a continued low level of water quality complaints (0.07 per 1000 properties) from customers.

Providing our customers with high quality, safe drinking water is the top priority for City West Water.

Anne Barker
Managing Director

1.Introduction

City West Water is one of three metropolitan water retailers established under Section 85(1A) of the *Water Act 1989* (Vic). Our Board of Directors is appointed by the Victorian Government and is responsible for setting and overseeing the implementation of the policies, objectives and strategies of the business. We provide drinking water, trade waste, recycled water, stormwater and sewerage services to approximately 379,000 residential and non residential customers in Melbourne's inner and western suburbs, as well as the central business district.

Melbourne Water provides City West Water with a bulk water supply and a waste water treatment service. Melbourne Water manages the water catchments and dams, as well as a network of large water mains that interconnects with our own water supply network. This interconnection means that risks associated with water supply are shared between the wholesaler (Melbourne Water) and retailer (City West Water).

To manage these risks and to clearly assign the rights and obligations of both parties, we have a contractual arrangement (a Bulk Water Supply Agreement) with Melbourne Water, as well as cross business contingency plans and operational arrangements.

Our management of the water supply system and drinking water quality is given the highest priority to reflect public health considerations and community expectations, as well as continuing to provide among the highest quality drinking water in the world. Our management of the drinking water supply follows the risk management principles outlined in Victoria's *Safe Drinking Water Act (2003)*. This commitment to safeguarding drinking water quality has continued to be independently recognised through consistent retention of our internationally recognised Hazard Analysis and Critical Control Points (HACCP) certification.

KEY TO LOCALITIES

1 Werribee
1A Little River
2 Altona
2A Werribee South
3A Maribyrnong
3B Williamstown
4 Deer Park
5 Caroline Springs
5A Taylors Lakes
6 East Keilor
7A Tullamarine
9A Strathmore
9B Moonee Ponds
11 Parkville
54 Richmond

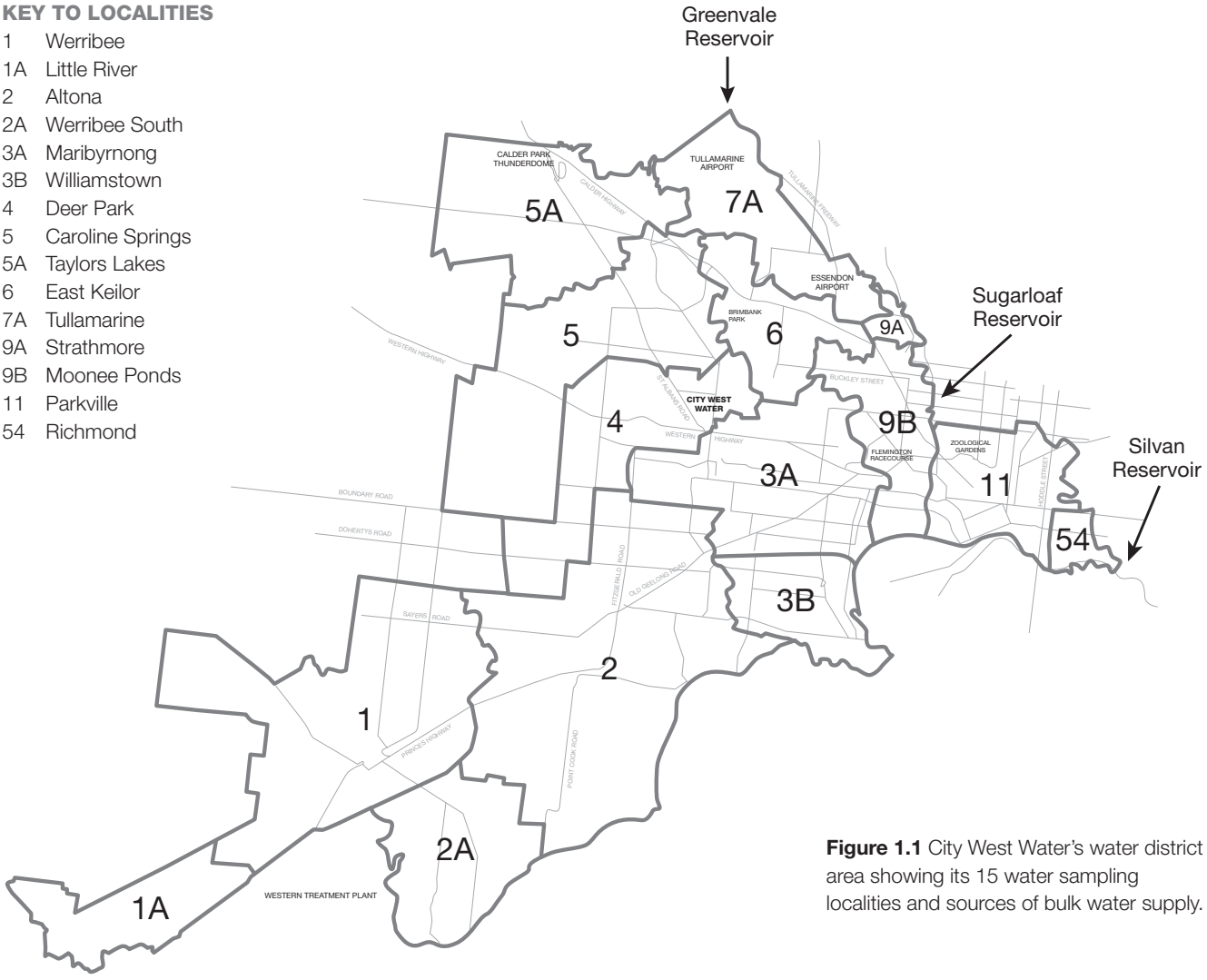


Figure 1.1 City West Water's water district area showing its 15 water sampling localities and sources of bulk water supply.

1.1 Characterisation of the system

We distribute water to over 800,000 residents at some 379,000 properties, and to commercial, industrial and institutional customers. The water travels through an extensive distribution network consisting of over 4500 kilometres of water mains, 10 pumping stations, eight service reservoirs and tanks and four secondary chlorination plants. This network encompasses central and western Melbourne, ranging from inner suburban areas such as Fitzroy, Collingwood, Richmond and the central business district, to outer western suburbs as far west as Little River. The network is totally enclosed, protecting the water from contamination.

Figure 1.1 shows the entire 580 square kilometre water district area to which we supply drinking water. It is divided into 15 water sampling localities based on sources of water supply and similar pressure.

1.1.1 Source of water

The water supply originates from Melbourne's well established water supply catchment and reservoir system, which has provided the city with a reliable, high quality water supply for many years. This system, managed by Melbourne Water, lies mainly to the east of Melbourne and extends as far as Thomson Reservoir, about 120 kilometres from our supply area.

More specifically, water is supplied to City West Water from three major storages within the system. Two of the storages, Silvan Reservoir (near Mount Dandenong) and Sugarloaf Reservoir (near Yarra Glen), are east of Melbourne. The third, Greenvale Reservoir, is to the north, near Somerton. On average, we have traditionally sourced about 40% of our bulk supply from Silvan, 30% from Greenvale and 30% from Sugarloaf.

However, with the decade of below average rainfall that began in the late 1990s, and the need to rebalance storage levels, the percentages in recent years reflect increased emphasis on Sugarloaf Reservoir as the major source of water being supplied to City West Water.

The supply from Silvan and Greenvale Reservoirs originates from protected, natural catchments (including the Thomson and Upper Yarra catchments) where activities such as industry, farming, urbanisation and tourism (which could pollute the water supply) are highly restricted. Long storage periods (ranging between months and years) in these pristine reservoirs enhance water quality. As a result, the only active water treatment process that is applied to this water is chlorination and pH correction with lime.

Sugarloaf Reservoir draws most of its water from the middle reaches of the Yarra River where the catchment is unprotected, containing urban areas, light industry and agricultural activities. A smaller proportion also comes from Maroondah Reservoir via the Maroondah Aqueduct. Between February and May 2010, water was also sourced for the first time from the Goulburn River via the North-South pipeline; however, use of this source has not since been repeated. On average, the source waters pumped into Sugarloaf Reservoir are stored for months before being treated (via coagulation with alum, filtration, chlorination and pH correction with lime) at Melbourne Water's nearby Winneke water treatment plant.

Melbourne Water adds fluoride to all of City West Water's bulk water in line with requirements of the *Victorian Health (Fluoridation) Act (1973)*.

The supply source(s) for each of our 15 water sampling localities are listed in Table 1.1

	Supply source to City West Water (%)		
Period	**Silvan**	**Greenvale**	**Sugarloaf**
Prior to drought impact	40	30	30
2007-08	11	23	65
2008-09	12	21	67
2009-10	19	21	60
2010-11	11	7	82
2011-12	16	8	76

Table 1.1 2011-12 supply sources for our water sampling localities

Water sampling locality	Source water	Treatment plant	Population serviced (2006 census)
Altona	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke Silvan Greenvale	56,949
Caroline Springs	Yarra River; Maroondah and Greenvale Reservoirs	Winneke Greenvale	87,921
Deer Park	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke Silvan Greenvale	37,510
East Keilor	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke Silvan Greenvale	36,331
Little River	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke Silvan Greenvale	870
Maribyrnong	Yarra River; Maroondah and Silvan Reservoirs	Winneke Silvan	97,419
Moonee Ponds	Yarra River; Maroondah and Silvan Reservoirs	Winneke Silvan	61,869
Parkville	Yarra River; Maroondah and Silvan Reservoirs	Winneke Silvan	99,419
Richmond	Yarra River; Maroondah and Silvan Reservoirs	Winneke Silvan	19,493
Strathmore	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke Silvan Greenvale	7557
Taylors Lakes	Yarra River; Maroondah and Greenvale Reservoirs	Winneke Greenvale	47,173
Tullamarine	Yarra River; Maroondah and Greenvale Reservoirs	Winneke Greenvale	9467
Werribee	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke Silvan Greenvale	91,957
Werribee South	Yarra River; Maroondah, Silvan and Greenvale Reservoirs	Winneke Silvan Greenvale	1649
Williamstown	Yarra River; Maroondah and Silvan Reservoirs	Winneke Silvan	39,625

The quality of the bulk water supply is monitored by Melbourne Water before it enters City West Water's distribution system.

2. Water treatment and quality management system

2.1 Water treatment

The water quality treatment processes used for City West Water's source or bulk water supply are outlined in Section 1.1.1.

Notwithstanding Melbourne Water's source or bulk water disinfection by chlorination, additional secondary chlorination (using liquid sodium hypochlorite) is undertaken within our water district by:

- Melbourne Water, with four secondary chlorination plants servicing the water sampling localities of Werribee, Deer Park, Caroline Springs and Altona
- City West Water, with a further four secondary chlorination plants servicing the water sampling localities of Little River, Werribee South, East Keilor and Richmond.

2.2 Issues

No adverse issues took place with regard to water treatment during 2011-12.

3. Quality of drinking water for 2011-12

A significant part of our water supply activities are devoted to monitoring the quality of the water supplied to customers. A day to day water monitoring program involves sampling and testing from many locations throughout the distribution network of 15 water sampling localities, including 380 purpose built sampling fittings located at customers' properties across the water district area (referred to as 'customer taps'). Melbourne Water monitors the quality of bulk water supplies at points upstream of delivery points to City West Water. The results of these tests are scrutinised under the Bulk Water Supply Agreement between the two corporations.

Between July 2011 and June 2012, we collected and tested approximately 2700 microbiological and 900 physical/chemical water samples from customer taps. This was undertaken under contract by a government approved, specialised and quality certified laboratory. The extent of this monitoring was based on requirements of the *Safe Drinking Water Regulations (2005)*, as well as guidance of the *Australian Drinking Water Guidelines 2004 (ADWG 2004)*, including locality population numbers for bacterial monitoring.

As well as guiding the design of monitoring programs, *ADWG 2004* provides a basis for assessing the quality of drinking water. Microbiological assessment is based principally on the bacterium *Escherichia coli (E. coli)*, which is considered to definitively indicate the presence of faecal contamination and, therefore, health risk.

Physical/chemical assessment and monitoring is based on a combination of parameters that indicate physical/aesthetic characteristics, such as pH, colour and turbidity (the clarity of the water), as well as the chemical quality of the water (i.e. levels of chlorine, iron, fluoride, dissolved salts, aluminium, copper and other heavy metals). Contact information for obtaining further details of all water quality testing outlined in this report is provided in the section titled 'Further information.'

Since 1 July 2004, the management of drinking water in Victoria has been governed by the *Safe Drinking Water Act (2003)*. Under this Act, *Safe Drinking Water Regulations (2005)* specifies water quality standards for a number of water quality parameters. The standards are as follows:

Water quality parameter	Standard
Escherichia coli (E. coli)	At least 98% of samples collected in any 12 month period to contain no *E. coli* per 100mL
Chloroacetic acid	Must not exceed 0.15 mg/L
Dichloroacetic acid	Must not exceed 0.1 mg/L
Trichloroacetic acid	Must not exceed 0.1 mg/L
Trihalomethanes	Must not exceed 0.25 mg/L
Bromate	Must not exceed 0.02 mg/L
Formaldehyde	Must not exceed 0.5 mg/L
Aluminium (acid soluble)	Must not exceed 0.2 mg/L
Turbidity	95% upper confidence limit of mean of drinking water samples collected in the preceding 12 month period must not exceed 5.0 Nephelometric Turbidity Units (NTU)

Besides monitoring water quality for compliance against these standards, we monitor additional parameters that provide a more comprehensive characterisation of the water, as well as assisting the needs of customers (e.g. industry, students and researchers). Detailed summary data for these parameters are provided in Appendices A and B.

The tables in this section report the 2011-12 compliance of water quality standard parameters against the water quality standards specified in Victoria's *Safe Drinking Water Regulations 2005*.

3.1 *Escherichia coli (E. coli)*

3.1.1 Results

Table 3.1 *E. coli* summary results in drinking water samples obtained from customer taps tested between 1 July 2011 and 30 June 2012

Water sampling locality (locality number)	**No. of samples**	**Sampling frequency**	**No. of samples containing *E. coli***	**Max. result (orgs/100mL)**	**% Samples with no *E. coli***	**Complying (yes/no)**
Altona (2)	196	>weekly	0	<1	100	yes
Caroline Springs (5)	274	>weekly	0	<1	100	yes
Deer Park (4)	143	>weekly	0	<1	100	yes
East Keilor (6)	143	>weekly	0	<1	100	yes
Little River (1A)	65	>weekly	0	<1	100	yes
Maribyrnong (3A)	301	>weekly	0	<1	100	yes
Moonee Ponds (9B)	222	>weekly	0	<1	100	yes
Parkville (11)	300	>weekly	0	<1	100	yes
Richmond (54)	105	>weekly	0	<1	100	yes
Strathmore (9A)	78	>weekly	0	<1	100	yes
Taylors Lakes (5A)	170	>weekly	0	<1	100	yes
Tullamarine (7A)	79	>weekly	0	<1	100	yes
Werribee (1)	288	>weekly	1	1	99.7	yes
Werribee South (2A)	65	>weekly	0	<1	100	yes
Williamstown (3B)	144	>weekly	0	<1	100	yes
Total	2573	-	1	1	99.9	yes

E. coli data demonstrates compliance with the standard (at least 98% samples with no E. coli) in each of City West Water's 15 water sampling localities.

Sampling frequencies in each locality exceeded that prescribed by the Safe Drinking Water Regulations 2005 (i.e. one sample per week in each locality). This was done in order to meet more intense surveillance of internationally recognised population based frequencies, as advocated in ADWG 2004.

3.1.2 Actions in relation to non compliance

Even though there was compliance with the *E. coli* standard in all localities, *E. coli* (one organism per 100 mL) was detected in a sample from the Werribee locality in June 2012. The reason for the detection is not known. No other samples, whether upstream or downstream, including repeat sampling, showed presence of *E. coli*. In line with protocol, this was reported to the Victorian Department of Health as a Section 22 notification.

3.2 Chlorine based disinfection by-product chemicals

3.2.1 Results

In order to facilitate laboratory sample collections, monitoring for chlorine based disinfection by-product chemicals is scheduled on the basis of four week intervals. This strategy also aims to assist in ensuring that no less than 12 monthly samples are obtained for testing from each locality, as per *Safe Drinking Water Regulations (2005)*. However, a programming oversight by the contract laboratory resulted in no sample having been collected from the Moonee Ponds locality in December 2011. Subsequent discussions with key laboratory staff indicate that checking systems have been implemented to prevent a repeat omission.

Chloroacetic acid

Table 3.2a Chloroacetic acid summary results in drinking water samples obtained from customers' taps tested between 1 July 2011 and 30 June 2012

Water sampling locality (locality number)	**Sampling frequency**	**No. of samples**	**No. of non complying samples**	**Max. mg/L**	**Complying (yes/no)**
Altona (2)	monthly	13	0	<0.005	yes
Caroline Springs (5)	monthly	13	0	<0.005	yes
Deer Park (4)	monthly	13	0	<0.005	yes
East Keilor (6)	monthly	13	0	<0.005	yes
Little River (1A)	monthly	13	0	<0.005	yes
Maribyrnong (3A)	monthly	13	0	<0.005	yes
Moonee Ponds (9B)	monthly	12	0	<0.005	yes
Parkville (11)	monthly	13	0	<0.005	yes
Richmond (54)	monthly	13	0	<0.005	yes
Strathmore (9A)	monthly	13	0	<0.005	yes
Taylors Lakes (5A)	monthly	13	0	<0.005	yes
Tullamarine (7A)	monthly	13	0	<0.005	yes
Werribee (1)	monthly	13	0	<0.005	yes
Werribee South (2A)	monthly	13	0	<0.005	yes
Williamstown (3B)	monthly	13	0	<0.005	yes
Total	-	194	0	<0.005	yes

Chloroacetic acid data demonstrates compliance with the standard (0.15 mg/L) in each of City West Water's 15 water sampling localities.

Dichloroacetic acid

Table 3.2b Dichloroacetic acid summary results in drinking water samples obtained from customers' taps tested between 1 July 2011 and 30 June 2012

Water sampling locality (locality number)	**Sampling frequency**	**No. of samples**	**No. of non complying samples**	**Max. mg/L**	**Complying (yes/no)**
Altona (2)	monthly	13	0	<0.005	yes
Caroline Springs (5)	monthly	13	0	0.006	yes
Deer Park (4)	monthly	13	0	<0.005	yes
East Keilor (6)	monthly	13	0	<0.005	yes
Little River (1A)	monthly	13	0	0.006	yes
Maribyrnong (3A)	monthly	13	0	<0.005	yes
Moonee Ponds (9B)	monthly	12	0	<0.005	yes
Parkville (11)	monthly	13	0	0.008	yes
Richmond (54)	monthly	13	0	0.005	yes
Strathmore (9A)	monthly	13	0	<0.005	yes
Taylors Lakes (5A)	monthly	13	0	0.011	yes
Tullamarine (7A)	monthly	13	0	0.008	yes
Werribee (1)	monthly	13	0	<0.005	yes
Werribee South (2A)	monthly	13	0	<0.005	yes
Williamstown (3B)	monthly	13	0	<0.005	yes
Total	-	194	0	0.011	yes

Dichloroacetic acid data demonstrates compliance with the standard (0.1 mg/L) in each of our 15 water sampling localities.

Trichloroacetic acid

Table 3.2c Trichloroacetic acid summary results in drinking water samples obtained from customers' taps tested between 1 July 2011 and 30 June 2012

Water sampling locality (locality number)	**Sampling frequency**	**No. of samples**	**No. of non complying samples**	**Max. mg/L**	**Complying (yes/no)**
Altona (2)	monthly	13	0	0.015	yes
Caroline Springs (5)	monthly	13	0	0.044	yes
Deer Park (4)	monthly	13	0	0.010	yes
East Keilor (6)	monthly	13	0	0.007	yes
Little River (1A)	monthly	13	0	0.011	yes
Maribyrnong (3A)	monthly	13	0	0.020	yes
Moonee Ponds (9B)	monthly	12	0	0.012	yes
Parkville (11)	monthly	13	0	0.031	yes
Richmond (54)	monthly	13	0	0.038	yes
Strathmore (9A)	monthly	13	0	0.016	yes
Taylors Lakes (5A)	monthly	13	0	0.039	yes
Tullamarine (7A)	monthly	13	0	0.016	yes
Werribee (1)	monthly	13	0	0.010	yes
Werribee South (2A)	monthly	13	0	0.014	yes
Williamstown (3B)	monthly	13	0	0.019	yes
Total	-	194	0	0.044	yes

Trichloroacetic acid data demonstrates compliance with the standard (0.1 mg/L) in each of our 15 water sampling localities.

Total trihalomethanes

Table 3.2d Trihalomethanes summary results in drinking water samples obtained from customers' taps tested between 1 July 2011 and 30 June 2012

Water sampling locality (locality number)	Sampling frequency	No. of samples	No. of non complying samples	Max. mg/L	Complying (yes/no)
Altona (2)	monthly	13	0	0.058	yes
Caroline Springs (5)	monthly	13	0	0.093	yes
Deer Park (4)	monthly	13	0	0.050	yes
East Keilor (6)	monthly	13	0	0.048	yes
Little River (1A)	monthly	13	0	0.080	yes
Maribyrnong (3A)	monthly	13	0	0.069	yes
Moonee Ponds (9B)	monthly	12	0	0.065	yes
Parkville (11)	monthly	13	0	0.084	yes
Richmond (54)	monthly	13	0	0.089	yes
Strathmore (9A)	monthly	13	0	0.080	yes
Taylors Lakes (5A)	monthly	13	0	0.079	yes
Tullamarine (7A)	monthly	13	0	0.048	yes
Werribee (1)	monthly	13	0	0.065	yes
Werribee South (2A)	monthly	13	0	0.066	yes
Williamstown (3B)	monthly	13	0	0.064	yes
Total	-	194	0	0.093	yes

Total trihalomethanes data demonstrates compliance with the standard (0.25 mg/L) in each of our 15 water sampling localities.

3.2.2 Actions in relation to non compliance

With 100% compliance, no actions were necessary.

3.3 Ozone based disinfection by-product chemicals

3.3.1 Results

The *Safe Drinking Water Regulations 2005* refers to two ozone based disinfection by-product chemicals – bromate and formaldehyde. However, these two chemicals were not monitored on a regular basis for compliance purposes as our water supply is not treated with ozone (refer Section 2.1). Nevertheless, an annual customer tap water sample from each of the 15 water sampling localities was tested during May 2012. All 15 results for both bromate and formaldehyde showed levels lower than the respective standards of 0.02 mg/L and 0.5 mg/L (refer Appendix A).

3.3.2 Actions in relation to non compliance

As all 15 results for both bromate and formaldehyde showed levels lower than the respective standards of 0.02 mg/L and 0.5 mg/L, no actions were necessary.

3.4 Aluminium

3.4.1 Results

In order to facilitate laboratory sampling schedules, monitoring for aluminium was generally undertaken on a fortnightly basis as part of a suite of other physical/chemical parameters such as pH, colour, iron and manganese. This also assisted in ensuring that no less than the 12 monthly samples were obtained, as per *Safe Drinking Water Regulations (2005)*.

Table 3.3 Aluminium (acid soluble) summary results in drinking water samples obtained from customers' taps tested between 1 July 2011 and 30 June 2012

Water sampling locality (locality number)	**Sampling frequency**	**No. of samples**	**No. of non complying samples**	**Max. mg/L**	**Complying (yes/no)**
Altona (2)	fortnightly	26	0	0.03	yes
Caroline Springs (5)	fortnightly	26	0	0.03	yes
Deer Park (4)	fortnightly	26	0	0.03	yes
East Keilor (6)	fortnightly	26	0	0.04	yes
Little River (1A)	fortnightly	26	0	0.03	yes
Maribyrnong (3A)	fortnightly	26	0	0.03	yes
Moonee Ponds (9B)	fortnightly	25	0	0.03	yes
Parkville (11)	fortnightly	26	0	0.03	yes
Richmond (54)	fortnightly	26	0	0.05	yes
Strathmore (9A)	fortnightly	26	0	0.03	yes
Taylors Lakes (5A)	fortnightly	26	0	0.04	yes
Tullamarine (7A)	fortnightly	27	0	0.03	yes
Werribee (1)	fortnightly	26	0	0.03	yes
Werribee South (2A)	fortnightly	26	0	0.03	yes
Williamstown (3B)	fortnightly	26	0	0.03	yes
Total	-	390	0	0.05	yes

Acid soluble aluminium data demonstrates compliance with the standard (0.2 mg/L) in each of our 15 water sampling localities.

3.4.2 Actions in relation to non compliance

With 100% compliance, no actions were necessary.

3.5 Turbidity

3.5.1 Results

Table 3.4 Turbidity summary results in drinking water samples obtained from customers' taps tested between 1 July 2011 and 30 June 2012

Water sampling locality (locality number)	**Sampling frequency**	**No. of samples**	**Max. NTU**	**95% UCL of mean**	**Complying (yes/no)**
Altona (2)	weekly	52	0.8	0.3	yes
Caroline Springs (5)	weekly	52	2.5	1.2	yes
Deer Park (4)	weekly	52	1.1	0.3	yes
East Keilor (6)	weekly	52	1.0	0.2	yes
Little River (1A)	weekly	52	1.0	0.3	yes
Maribyrnong (3A)	weekly	52	0.8	0.4	yes
Moonee Ponds (9B)	weekly	52	0.8	0.4	yes
Parkville (11)	weekly	52	1.1	0.5	yes
Richmond (54)	weekly	52	2.2	0.9	yes
Strathmore (9A)	weekly	52	2.9	0.6	yes
Taylors Lakes (5A)	weekly	52	2.8	1.3	yes
Tullamarine (7A)	weekly	53	4.9	1.1	yes
Werribee (1)	weekly	52	0.9	0.3	yes
Werribee South (2A)	weekly	52	1.0	0.3	yes
Williamstown (3B)	weekly	52	0.6	0.3	yes
Total	-	781	4.9	0.5	yes

Turbidity data demonstrates compliance with the standard in each of our 15 water sampling localities.

3.5.2 Actions in relation to non compliance

With 100% compliance against the standard, no remedial water quality actions were necessary.

3.6 Fluoride

3.6.1 Results

Table 3.5 Fluoride summary results in drinking water samples obtained from customers' taps tested between 1 July 2011 and 30 June 2012

Water sampling locality (locality number)	**Sampling frequency**	**No. of samples**	**Max. mg/L**	**Min. mg/L**	**Average mg/L**	**Complying (yes/no)**
Altona (2)	fortnightly	28	0.98	0.77	0.89	yes
Caroline Springs (5)	fortnightly	27	1.00	0.78	0.91	yes
Deer Park (4)	fortnightly	28	0.98	0.79	0.88	yes
East Keilor (6)	fortnightly	27	0.97	0.64	0.88	yes
Little River (1A)	fortnightly	28	1.20	0.74	0.90	yes
Maribyrnong (3A)	fortnightly	28	0.98	0.84	0.90	yes
Moonee Ponds (9B)	fortnightly	27	0.95	0.73	0.89	yes
Parkville (11)	fortnightly	28	0.96	0.78	0.88	yes
Richmond (54)	fortnightly	28	0.99	0.74	0.89	yes
Strathmore (9A)	fortnightly	28	0.94	0.80	0.90	yes
Taylors Lakes (5A)	fortnightly	27	1.10	0.89	0.94	yes
Tullamarine (7A)	fortnightly	28	1.00	0.85	0.91	yes
Werribee (1)	fortnightly	28	1.00	0.79	0.89	yes
Werribee South (2A)	fortnightly	28	0.94	0.84	0.89	yes
Williamstown (3B)	fortnightly	28	0.95	0.80	0.90	yes
Total	-	416	1.20	0.64	0.90	yes

For fluoridated supplies, compliance means all individual sample results are less than or equal to 1.5 mg/L and the annual average does not exceed 1.0 mg/L. Fluoride data demonstrates compliance in each of our 15 water sampling localities.

3.6.2 Actions in relation to non compliance

With 100% fluoride compliance, no remedial water quality actions were necessary.

3.7 Other algae, pathogen, chemical or substance not previously specified that may pose a risk to human health

3.7.1 Results

In addition to the water quality parameters designated as standards by the *Safe Drinking Water Regulations 2005*, we also monitor a range of other microbiological and chemical parameters that provide further information on the overall quality of our drinking water supply. Among such other parameters that were monitored in 2011-12, those that could potentially represent a health risk (if present above *ADWG 2011* health guideline levels), are listed in Table 3.6.

Table 3.6 Potential health risk water quality parameters monitored during 2011-12

Parameter	Frequency of testing	Results
Microbiological		
Vibrio spp.	3 to 4 samples per month (3 samples per locality per year)	None detected (therefore, consistent with *ADWG (2011)* which states that these parameters should not be present in drinking water)
Shigella spp.		
Yersinia spp.		
Salmonella spp.		
Campylobacter spp.		
Giardia spp.		
Cryptosporidium spp.		
Adenovirus		
Hepatitis A virus		
Reovirus		
Enterovirus		
Rotavirus		
Chemical*		
Arsenic	annually per locality	within guideline (not detected)
Cadmium	annually per locality	within guideline (not detected)
Chromium	annually per locality	within guideline (not detected)
Copper	annually per locality	within guideline
Cyanide	annually per locality	within guideline (not detected)
Fluoride	fortnightly per locality	within guideline
Lead	annually per locality	within guideline (not detected)
Manganese	fortnightly per locality	within guideline
Mercury	annually per locality	within guideline (not detected)
Nitrate	annually per locality	within guideline
Sulphate	annually per locality	within guideline
Zinc	annually per locality	within guideline (not detected)

* *ADWG (2011)* health-related guidelines are shown in Appendix A.

Further details of monitoring results for manganese, lead, copper and arsenic are contained in Table 3.7.

Table 3.7 Detailed monitoring results for manganese, lead, copper and arsenic during 2011-12

Water sampling locality (locality number)	Parameter	Sampling frequency	No. of samples	No. of non complying results*	Max. mg/L	Complying* (yes/no)
Altona (2)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.006 <0.01 <0.01 <0.01	Yes Yes Yes Yes
Caroline Springs (5)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.007 <0.01 <0.01 <0.01	Yes Yes Yes Yes
Deer Park (4)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.002 <0.01 <0.01 <0.01	Yes Yes Yes Yes
East Keilor (6)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.004 <0.01 0.01 <0.01	Yes Yes Yes Yes
Little River (1A)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.003 <0.01 0.02 <0.01	Yes Yes Yes Yes
Maribyrnong (3A)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.003 <0.01 0.02 <0.01	Yes Yes Yes Yes
Moonee Ponds (9B)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	25 1 1 1	0 0 0 0	0.004 <0.01 0.02 <0.01	Yes Yes Yes Yes
Parkville (11)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.008 <0.01 <0.01 <0.01	Yes Yes Yes Yes
Richmond (54)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.016 <0.01 0.02 <0.01	Yes Yes Yes Yes
Strathmore (9A)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.025 <0.01 <0.01 <0.01	Yes Yes Yes Yes
Taylors Lakes (5A)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.011 <0.01 0.01 <0.01	Yes Yes Yes Yes
Tullamarine (7A)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	27 1 1 1	0 0 0 0	0.015 <0.01 0.01 <0.01	Yes Yes Yes Yes
Werribee (1)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.003 <0.01 <0.01 <0.01	Yes Yes Yes Yes
Werribee South (2A)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.006 <0.001 <0.002 <0.001	Yes Yes Yes Yes
Williamstown (3B)	Manganese Lead Copper Arsenic	fortnightly annually annually annually	26 1 1 1	0 0 0 0	0.007 <0.01 <0.01 <0.01	Yes Yes Yes Yes

* as defined in the health-related guideline values in *ADWG 2011*.

3.7.2 Actions in relation to non compliance

Since levels of all health-related parameters tested satisfied *ADWG 2011* guideline values at customer taps sites, no related remedial water quality actions were necessary.

As our water supply distribution network is completely enclosed, any monitoring for organic industrial chemicals, pesticides and radioactivity focuses on locations upstream of this network. Thus Melbourne Water tests for these substances with respect to its major storage reservoirs such as Silvan and Sugarloaf, where the potential for contamination is greater. Results of this monitoring are provided to us. No significant detections (with respect to *ADWG 2011* guidelines) took place in 2011-12.

A comprehensive outline of our monitoring data for individual localities, together with monitoring frequencies, Victorian standards and *ADWG 2011* guidelines for both health-related and aesthetic water quality data, is contained in Appendix A. Contact information for obtaining further details of all water quality testing outlined in this report is provided in the section headed 'Further Information'.

3.8 Aesthetics

3.8.1 Results

Monitoring results for the aesthetic water quality parameters comprising pH, colour, hardness and iron are shown in Table 3.8. Note that our colour tests are undertaken as apparent colour while the *ADWG 2011* guideline of 15 platinum cobalt units (PCU) refers to true colour. Due to the omission of a filtering step in the test for apparent colour, the subsequent result values are at least equal to, but not less than, the equivalent true colour values. As a result, true colour compliance with respect to the *ADWG 2011* guideline is assured in all cases where apparent colour levels are within the guideline. Past investigations have shown that for Melbourne's water supply, an apparent colour level of 25 PCU is equivalent to a true colour level of 15 PCU.

All 2011-12 water colour, hardness and iron monitoring data complied with the respective *ADWG 2011* guideline levels of 15 PCU, 200 mg/L and 0.3 mg/L.

Of the 390 samples tested for pH, there were five instances where pH readings were not within the *ADWG (2011)* guideline range of 6.5 to 8.5, although none exceeded the tolerable value of 9.2 (based on the presence of cement lined water mains, generally within more sparsely populated areas experiencing low water flows).

In association with water industry partners, we have investigated variations in pH throughout Melbourne's water supply system and their possible significance.

A 1999-00 Melbourne study concluded that widespread remedial treatment would be complex and would involve adding chemicals to Melbourne's water supply, with uncertain benefits. A joint water industry study by researchers at Melbourne's Alfred Hospital in 2000 concluded 'there was no indication of the health effects on skin for weakly buffered water, such as that found in Melbourne, over all pH ranges.' A 2003 joint study provided an updated review of the possible effects of elevated pH, weakly buffered (soft) drinking water on health, water supply assets and industrial processes. This study found that for such water there was:

- virtually an absence of published material indicating any adverse impact on human health, either from contact or ingestion
- no apparent adverse impact on water industry assets
- no evidence of deleterious effects on domestic appliances
- no apparent adverse impact on industrial users.

Nevertheless, we are continuing our practice of avoiding, where possible, the use of new water main materials that could impact upon water pH.

Table 3.8 Detailed monitoring results for pH, apparent colour, hardness and iron during 2011-12

Water sampling locality (locality number)	Parameter	Sampling frequency	No. of samples	Max*	Min*	Average*
Altona (2)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	7.5 4 27 0.06	7.1 <2 27 <0.02	7.3 2 27 0.02
Caroline Springs (5)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	9.0 10 22 0.16	7.0 <2 22 <0.02	7.5 5 22 0.07
Deer Park (4)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	7.9 4 28 0.04	7.0 <2 28 <0.02	7.4 2 28 <0.02
East Keilor (6)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	8.0 6 19 0.04	7.0 <2 19 <0.02	7.4 2 19 <0.02
Little River (1A)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	8.2 4 45 0.06	6.4 <2 45 <0.02	7.1 <2 45 0.02
Maribyrnong (3A)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	7.5 6 27 0.04	7.1 <2 27 <0.02	7.2 2 27 0.03
Moonee Ponds (9B)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	25 25 1 25	7.4 6 25 0.08	7.0 <2 25 <0.02	7.2 3 25 0.03
Parkville (11)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	7.3 10 27 0.15	7.0 <2 27 <0.02	7.2 3 27 0.04
Richmond (54)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	7.5 12 11 0.12	6.9 4 11 0.06	7.3 8 11 0.07
Strathmore (9A)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	7.8 10 19 0.11	7.1 <2 19 <0.02	7.4 4 19 0.04
Taylors Lakes (5A)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	7.6 12 18 0.23	7.0 <2 18 0.04	7.2 6 18 0.08
Tullamarine (7A)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	27 27 1 27	7.8 10 14 0.20	6.9 <2 14 <0.02	7.3 3 14 0.05
Werribee (1)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	9.1 4 29 0.06	6.9 <2 29 <0.02	7.7 2 29 <0.02
Werribee South (2A)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	8.4 4 24 0.07	7.2 <2 24 <0.02	7.6 2 24 0.02
Williamstown (3B)	pH apparent colour hardness iron	fortnightly fortnightly annually fortnightly	26 26 1 26	7.9 6 26 0.05	6.6 <2 26 <0.02	7.2 2 26 0.02

* Units: pH (units); apparent colour (platinum cobalt units); hardness (mg/L as calcium carbonate); iron (mg/L).

3.9 Analysis of results - trends

This section of the report examines:

(a) trends over time of water quality parameters tested that are designated as standards by the *Safe Drinking Water Regulations (2005)*.

(b) trends over time and between localities of parameters listed in Appendix A tables that have a corresponding Victorian standard or *ADWG (2011)* guideline.

3.9.1 Historical compliance of standard parameters

Table 3.9 summarises trends over time (and extent of compliance) of water quality parameters designated as standards by the *Safe Drinking Water Regulations (2005)*.

3.9.2 Parameter trends over time and between localities

This section of the report provides a three year overview of drinking water quality in our area, in terms of trends over time and between localities. Parameters considered are those listed in Appendix A tables that have a corresponding Victorian standard or *ADWG (2011)* guideline and have been monitored for at least the last two years. Graphical representations of trends are contained in Appendix B and briefly discussed below.

E. coli

(refer Figure B.1 in Appendix B)

E. coli performance in our drinking water has consistently complied with the current Victorian standard (requiring "at least 98% of samples collected in any 12 month period to contain no *E. coli* per 100mL") in all water sampling localities.

Free chlorine

(refer Figure B.2 in Appendix B)

All of our drinking water supply is disinfected with chlorine. As a result, the more active form (free chlorine) is present in all water sampling localities, with levels well within the maximum *ADWG 2011* guideline of 5 mg/L. Nevertheless, average levels among individual localities can be markedly different; this being largely due to relative proximity to chlorine dosing points. For example, the Taylors Lakes and Tullamarine localities are situated close to primary chlorination at Greenvale Reservoir, while the Little River locality is served by a secondary re-chlorination plant.

Aluminium

(refer Figure B.3 in Appendix B)

Overall aluminium levels in the water supply are low. Apparent variations at these levels are considered to be related to natural variations in the catchments rather than from artificial treatment dosing. For example, aluminium is only used in water treatment at the Winneke Treatment Plant, yet the water sampling localities more likely to receive water from this source (Moonee Ponds, Parkville, Altona, Werribee) do not exhibit higher aluminium levels as compared with the other localities.

Table 3.9 Compliance time trends of standard parameters

Parameter	Standard (2005 Regulations)	Localities compliant (% of customers supplied with compliant water)			
		2011-12	2010-11	2009-10	2008-09
E. coli	<1 per 100mL in 98% of samples	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Chloroacetic acid	0.15 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Dichloroacetic acid	0.1 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Trichloroacetic acid	0.1 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Trihalomethanes	0.25 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Bromate	0.02 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Formaldehyde	0.5 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Aluminium	0.2 mg/L	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)
Turbidity	95% UCL of mean <= 5.0 NTU*	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)	15 / 15 (100%)

* 95% upper confidence level of mean not to exceed 5.0 NTU

Arsenic, cadmium, chromium, cyanide, lead, mercury, zinc

These substances have been monitored on an annual basis. As can be seen in the Appendix A tables, test results have consistently been either within guideline levels or below analytical detection limits.

Chloride
(refer Figure B.4 in Appendix B)

Chloride levels are quite low and relatively consistent amongst the water sampling localities.

Colour
(refer Figure B.5 in Appendix B)

ADWG (2011) refers to 'true colour' of water; however we have continued the historical practice of measuring the more conservative 'apparent colour', which gives higher readings. Nevertheless, our average apparent colour levels have been within the *ADWG (2011)* True Colour guideline of 15 PCU. Higher colour levels in the Richmond locality are associated with its traditional bulk supply source from Silvan Reservoir.

Copper
(refer Figure B.6 in Appendix B)

Copper levels in the water supply are low and consistently well within the *ADWG (2011)* health and aesthetic guidelines.

Electrical conductivity (EC)
(refer Figure B.7 in Appendix B)

We measure EC as a surrogate for total dissolved solids (TDS). *ADWG (2011)* advises that its TDS guideline level of 600 mg/L can be substituted by an EC level of approximately 900 µs/cm. EC levels are quite low and relatively consistent within each water sampling locality. Localities with higher EC levels tend to reflect a larger proportion of supply from the higher EC Sugarloaf/Winneke source.

Fluoride
(refer Figure B.8 in Appendix B)

Fluoride levels in the water supply are the result of fluoridation of the bulk supply. Dosing is controlled such that levels are generally maintained between approximately 0.9 and 1.0 mg/L. Lower 2009-10 average levels in most localities resulted from disruption to fluoridation at Winneke treatment plant in late 2009 due to Melbourne Water's upgrade of the fluoridation unit.

Hardness
(refer Figure B.9 in Appendix B)

Water hardness levels are quite low and relatively consistent within each water quality locality. The higher hardness levels in most localities reflect supply into our area from the Sugarloaf reservoir.

Iron
(refer Figure B.10 in Appendix B)

Overall, slightly higher iron levels in the Caroline Springs, Taylors Lakes, Tullamarine and Richmond water quality localities are consistent with their source water including the relatively greater iron containing water from Silvan and Greenvale reservoirs.

Manganese
(refer Figure B.11 in Appendix B)

Manganese levels in the water supply are low and consistently well within the guidelines.

Nitrate
(refer Figure B.12 in Appendix B)

Nitrate levels in the water supply are low and consistently well within the guidelines.

pH
(refer Figure B.13 in Appendix B)

Average pH levels in 2011-12 were all between 7 and 8. The marked pH decrease in the Little River locality is due to the successful fine tuning of its dedicated carbon dioxide dosing unit.

Sodium
(refer Figure B.14 in Appendix B)

Sodium levels are quite low and relatively consistent among the water sampling localities.

Turbidity
(refer Figure B.15 in Appendix B)

Average 2011-12 turbidity levels in all localities were less than 1.5 NTU. Variations amongst individual water sampling localities are a reflection of their source waters. For example, localities with lower turbidity tend to be supplied more from Sugarloaf/Winneke, while higher turbidity localities tend to be supplied more from Silvan and Greenvale reservoirs.

Sulphate
(refer Figure B.16 in Appendix B)

Sulphate levels are quite low and relatively consistent within each water quality locality. Lower sulphate (as well as sodium, hardness, conductivity and chloride – as per earlier Figures) levels in Caroline Springs, Richmond and Taylors Lakes localities are a reflection of the Silvan reservoir source. At the same time, higher turbidity, iron and colour in these localities also reflects Silvan as the source of the water.

Total trihalomethanes
(refer Figure B.17 in Appendix B)

Total trihalomethanes concentrations are relatively low (in comparison with the Victorian standard) and consistent among water sampling localities. Highest levels in Little River and Richmond reflect their remoteness from primary chlorination.

Chloroacetic acids

The readings in the water supply are low and consistently well within the Victorian standards (refer Section 3.2.1).

4. Emergency and incident management

This section outlines events involving actual or potential adverse changes in water supply quality during 2011-12, including those that were reported to Victoria's Department of Health in line with Section 22 of the *Safe Drinking Water Act (2003)*.

Despite full compliance with the *E. coli* standard at customer tap supplies throughout 2011-12, routine monitoring within our water supply network resulted in four instances of *E. coli* detection. These were as follows:

- as mentioned in Section 3.1.2, one detection (one organism per 100mL) in a routine customer tap sample from Werribee locality on 21 June 2012. The cause for the detection is not known. No other samples, whether upstream or downstream, including repeat sampling, showed presence of *E. coli*.
- one detection (one organism per 100mL) in a non-routine customer tap sample from Taylors Lakes locality on 22 December 2011. The cause for the detection is not known. No other samples, whether upstream or downstream, including repeat sampling, showed presence of *E. coli*.
- one detection (nine organisms per 100mL) in a non-routine sample from Maribyrnong locality on 2 December 2011. The detection is considered to have been caused by use of a portable standpipe to obtain the water sample under non-aseptic conditions. No other samples, whether upstream or downstream, including repeat sampling, showed presence of *E. coli*.
- one detection (one organisms per 100mL) at Hillside Elevated Tank (which supplies part of the Taylors Lakes locality) on 30 December 2011. The tank was not in service at that time. It was spot dosed with chlorine on 31 December. A non-routine re-sample on 1 January 2012 was negative for *E. coli*. Subsequent routine samples were also negative for *E. coli*.

Each of the above *E. coli* detections and follow up actions were immediately reported to Victoria's Department of Health as Section 22 notifications, thus maintaining consistency with our water quality Risk Management Plan.

5. Complaints relating to water quality

In 2011-12, City West Water received 267 complaints related to water supply quality. The various categories of complaints were distributed as shown in Table 5.1.

Table 5.1 Water quality related customer complaints received in 2011-12

Complaint category	Number of complaints	No. of complaints per 100 customers supplied*
Discoloured water	159	0.042
Alleged illness	1	<0.001
Air in water	5	0.001
Blue-green water	7	0.002
Taste/odour	92	0.024
Other	3	<0.001

* Number of customers (properties) at 30 June 2012 determined as 379,000.

The number of complaints did not exceed 10 per 100 customers in any of the 15 localities.

An historical comparison of water quality related complaints received over the last five years is contained in Table 5.2.

Table 5.2 Water quality related customer complaints received over the last five years

Complaint category	Number received in 2011-12	Number received in 2010-11	Number received in 2009-10	Number received in 2008-09	Number received in 2007-08
Discoloured water	159	155	230	167	135
Alleged illness	1	2	-	-	1
Air in water	5	7	10	65	37
Blue-green water	7	3	7	3	9
Taste/odour	92 (20 chlorine)*	51 (24 chlorine)*	69 (27 chlorine)*	53 (6 chlorine)*	177 (64 chlorine)*
Other	3 (1 staining) (2 blocked filter)	2 (staining)	1 (staining)	3 (blocked filter)	-
Total	**267**	**220**	**317**	**291**	**359**
No. of properties	379,000	368,000	357,000	345,000	337,000
Complaints per 100 properties	0.070	0.060	0.089	0.084	0.11

* Number of complaints received of chlorine taste or odour.

Complaints and responses

We provide individual responses to water quality related complaints. These can range between verbal clarification of perceived issues, to onsite investigations and remedial action. In terms of the major complaint categories, our responses are as follows.

Discoloured (e.g. brown) water

Discoloured water is generally caused by the suspension of accumulated natural sediments in water mains. This can be triggered by the opening or closing of valves and reinstatement of mains into service following repairs. It can also result from older, rusting internal galvanised iron pipes. Calls to City West Water are assessed by trained staff and, where the discoloured water is deemed to be originating from the water main, targeted mains flushing is generally undertaken.

Alleged illness

Complaints of water related illness are referred to our Water Quality Scientist for detailed discussion, analysis and investigation. Customers may be advised to seek medical advice.

White water (air in water)

White water (water with a cloudy appearance that clarifies within a few minutes) indicates the presence of tiny, harmless air bubbles. It tends to be associated with maintenance and repair works, when air can enter water pipes. As the aerated water is used by customers, its appearance returns to normal. In the past we often responded to customers' concerns with targeted mains flushing, however since the recent drought and water restrictions, greater emphasis is placed on better explaining the phenomenon and obtaining customers' agreements to not flush water mains.

Blue-green water

On a seemingly random basis, customers at a small number of properties report blue-green water (water that has a cloudy to blue-green appearance, possibly containing blue-green particles, and having an unpleasant bitter taste). This is caused by accelerated corrosion of customers' internal copper water pipes and appears to be restricted to cold water pipes.

> Blue-green water must not be consumed (by drinking or in the preparation of food) because it can cause vomiting. The prolonged consumption of water containing elevated copper levels can have adverse health effects.

As blue-green water originates from a property's internal copper pipes, customers can manage the problem by flushing their tap with fresh mains water. This means running their tap until the water becomes 'crystal clear.'

In certain cases, corrosion of copper pipes can lead to perforation and leakage.

Neither the cause of, nor solution to this international and Australia wide copper corrosion phenomenon are known (apart from replacement of corroding pipes).

We assist customers experiencing copper pipe corrosion by testing copper levels in their water and providing advice on how to best manage the issue of blue-green water. If customers are experiencing blue-green water or have other water quality concerns, they are asked to call us on 132 642 for further information and advice.

Taste or odour

A change in taste or odour of tap water can occur occasionally and is generally apparent as a chlorine-like or earthy, musty sensation. Fluctuations in chlorine levels (and hence, the perception of chlorine taste or odour) occur from time to time, largely due to changed water demands and flow rates. Our response to customers reporting chlorine taste/odour involves providing an explanation, as well as considering changes to chlorine dosing.

Other tastes/odours can result when water flows are slower and during flow reversals in large pipes. In such cases the cause is identified and, where appropriate, a combination of targeted flushing and/or changes to flow regimes are implemented.

6. Findings of the most recent risk management plan audit

Pursuant to the *Safe Drinking Water Act (2003)*, we have a documented water quality Risk Management Plan which is subject to independent audit in terms of its content and implementation. Our plan was audited for the third time in April 2012 and again found to be compliant with all requirements. A copy of the audit certificate is in Appendix C.

Notwithstanding the plan's compliance with the *Act*, the audit identified several opportunities for improvement. An outline of these opportunities for improvement, together with actions to address these is contained in Appendix C.

Significant portions of the Risk Management Plan are based on our pre-existing HACCP plan which itself is audited internally on a quarterly basis, as well as annually by an external, independent auditor. The HACCP plan specifically addresses issues such as staff training and development, calibration of equipment and maintenance and inspections of assets. Each of these is examined during independent annual audits. The HACCP system is highly regarded and well known in the food industry for protecting the welfare and safety of consumers. It is based on the identification and management of risks (to quality) at key points within a production or product delivery process.

The HACCP certification demonstrates that we attend to those parts of our network and operations that have an impact on water quality, including the policies and procedures to prevent backflow. The maintenance of HACCP certification requires continual vigilance and improvements to our water quality management operations. City West Water aims to continue meeting the HACCP requirements.

7. Undertakings under Section 30 of the Act

City West Water has not entered into any undertakings with the Department of Health, pursuant to section 30 of the *Safe Drinking Water Act (2003)*.

8. Exemptions from water quality standards under Section 20 and conditions imposed under Section 21 of the *Act*

City West Water did not have any Section 20 or 21 exemptions in place.

9. Variation to aesthetic standards under Section 19 of the *Act* and conditions imposed under Section 21 of the *Act*

City West Water did not have any Section 19 variations.

10. Regulated water

Regulated water is water that is the subject of a declaration made by the Minister for Health concerning water that is not drinking water. We do not manage any water supplies that have been declared as ‘regulated water.'

In certain cases however, we do supply water from our water distribution mains to customers with privately owned off-takes.

Such supplies are provided under a private agreement between City West Water and the customer. The agreement does not guarantee the pressure or quality of the supply downstream of the off-take point, albeit that we endeavour to maintain these. City West Water has embarked on a program to reduce the number of such private supplies.

11. Further information

For further information on the details of this report or on general water quality matters, please contact us on 131 691. Alternatively, contact the Water Quality Scientist, Georges Ruta directly on (03) 9313 8388 or email gruta@citywestwater.com.au. Written enquiries can be addressed to Mr Georges Ruta, City West Water, Locked Bag 350, Sunshine, Victoria, 3020.

APPENDIX A. Water quality data by locality

WATER QUALITY LOCALITY FOR PERIOD	ALTONA 1 July 2011 to 30 June 2012						LOCALITY No. 2 POPULATION 56,949 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	880	>weekly	196	196	100%
Total Coliforms	orgs/100mL	N	<1	<1	1	>weekly	196	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	196	196	within standard (actual 100%)
Free Chlorine	mg/L	5	<0.01	0.10	0.67	>weekly	196	196	100%
Total Chlorine	mg/L	5	0.01	0.20	0.98	>weekly	196	196	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	7.2	7.2	7.2	annually	1	-	-
Chloride	mg/L	250	20	20	20	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	2	4	fortnightly	26	26	100%
Conductivity	µS/cm	~900	100	122	130	fortnightly	26	26	100%
Copper	mg/L	1	<0.01	<0.01	<0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.77	0.89	0.98	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	27	27	27	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.02	0.06	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	2.2	2.2	2.2	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.002	0.006	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.86	1.86	1.86	annually	1	1	100%
pH	units	6.5-8.5	7.1	7.3	7.5	fortnightly	26	26	100%
pH	units	6.5-9.2	7.1	7.3	7.5	fortnightly	26	26	100%
Potassium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.8	4.8	4.8	annually	1	1	100%
Sodium	mg/L	180	9.8	9.8	9.8	annually	1	1	100%
Sulphate	mg/L	250	9.6	9.6	9.6	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.01	<0.01	<0.01	annually	1	-	-
Total Dissolved Solids	mg/L	600	110	110	110	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.3[1]	0.8	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.003	0.007	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.008	0.015	0.020	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.021	0.026	0.035	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.036	0.048	0.058	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.010	0.015	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	0.200	0.200	0.200	annually	1	1	100%

Notes:
* Internal City West Water guideline.
** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
N No guideline/standard set for this parameter.
Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
G Geometric means shown for bacterial parameters.
1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	CAROLINE SPRINGS 1 July 2011 to 30 June 2012						LOCALITY No. 5 POPULATION 87,921 (2006 Census)		
Parameter	**Unit**	**Guideline value** *(ADWG 2011)*	**Concentration or value (all samples)**			**Sampling frequency**	**No. of samples**		**Performance against standard/ guideline**
			Min	**Mean[G]**	**Max**		**Total**	**Passing**	
Total Plate Count (37°C)	orgs/mL	1000*	<1	1	940	>weekly	274	274	100%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	274	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	274	274	within standard (actual 100%)
Free Chlorine	mg/L	5	<0.01	0.11	0.70	>weekly	274	274	100%
Total Chlorine	mg/L	5	0.03	0.21	0.94	>weekly	274	274	100%
Alkalinity (as $CaCO_3$)	mg/L	N	16	16	16	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	6.4	6.4	6.4	annually	1	-	-
Chloride	mg/L	250	10	10	10	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	5	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	55	88	130	fortnightly	26	26	100%
Copper	mg/L	1	<0.01	<0.01	<0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.78	0.91	1.00	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	22	22	22	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.07	0.16	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.004	0.007	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.58	0.58	0.58	annually	1	1	100%
pH	units	6.5-8.5	7.0	7.5	9.0	fortnightly	26	24	92.3%
pH	units	6.5-9.2	7.0	7.5	9.0	fortnightly	26	26	100%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	mg/L	80	6.5	6.5	6.5	annually	1	1	100%
Sodium	mg/L	180	5.9	5.9	5.9	annually	1	1	100%
Sulphate	mg/L	250	2.1	2.1	2.1	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	0.012	0.012	0.012	annually	1	-	-
Total Dissolved Solids	mg/L	600	100	100	100	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	1.2[1]	2.5	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	0.003	0.007	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.007	0.010	0.017	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.013	0.035	0.081	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.030	0.048	0.093	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.006	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.016	0.044	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
* Internal City West Water guideline.
** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
N No guideline/standard set for this parameter.
Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
G Geometric means shown for bacterial parameters.
1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	DEER PARK 1 July 2011 to 30 June 2012						LOCALITY No. 4 POPULATION 37,510 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	2,000	>weekly	143	143	99%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	143	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	143	143	within standard (actual 100%)
Free Chlorine	mg/L	5	0.01	0.10	0.34	>weekly	143	143	100%
Total Chlorine	mg/L	5	0.04	0.20	0.37	>weekly	143	143	100%
Alkalinity (as $CaCO_3$)	mg/L	N	13	13	13	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	7.6	7.6	7.6	annually	1	-	-
Chloride	mg/L	250	20	20	20	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	2	4	fortnightly	26	26	100%
Conductivity	µS/cm	~900	120	130	150	fortnightly	26	26	100%
Copper	mg/L	1	<0.01	<0.01	<0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.79	0.88	0.98	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	28	28	28	annually	1	1	100%
Iron	mg/L	0.3	<0.02	<0.02	0.04	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	2.2	2.2	2.2	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.001	0.002	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.82	1.82	1.82	annually	1	1	100%
pH	units	6.5-8.5	7.0	7.4	7.9	fortnightly	26	26	100%
pH	units	6.5-9.2	7.0	7.4	7.9	fortnightly	26	26	100%
Potassium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.8	4.8	4.8	annually	1	1	100%
Sodium	mg/L	180	9.7	9.7	9.7	annually	1	1	100%
Sulphate	mg/L	250	9.7	9.7	9.7	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	0.006	0.006	0.006	annually	1	-	-
Total Dissolved Solids	mg/L	600	84	84	84	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.3[1]	1.1	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.004	0.008	0.010	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.010	0.015	0.019	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	monthly	13	-	-
Chloroform	mg/L	N	0.015	0.020	0.025	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.036	0.044	0.050	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.005	0.010	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	EAST KEILOR 1 July 2011 to 30 June 2012						LOCALITY No. 6 POPULATION 36,331 (2006 Census)		
Parameter	**Unit**	**Guideline value** *(ADWG 2011)*	**Concentration or value (all samples)**			**Sampling frequency**	**No. of samples**		**Performance against standard/ guideline**
			Min	**Mean[G]**	**Max**		**Total**	**Passing**	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	880	>weekly	143	143	100%
Total Coliforms	orgs/100mL	N	<1	<1	<1	>weekly	143	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	143	143	within standard (actual 100%)
Free Chlorine	mg/L	5	<0.01	0.18	0.54	>weekly	143	143	100%
Total Chlorine	mg/L	5	0.05	0.29	0.97	>weekly	143	143	100%
Alkalinity (as $CaCO_3$)	mg/L	N	15	15	15	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.04	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	5.4	5.4	5.4	annually	1	-	-
Chloride	mg/L	250	10	10	10	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	2	6	fortnightly	26	26	100%
Conductivity	µS/cm	~900	98	133	150	fortnightly	26	26	100%
Copper	mg/L	1	0.01	0.01	0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.64	0.88	0.97	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	19	19	19	annually	1	1	100%
Iron	mg/L	0.3	<0.02	<0.02	0.04	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	1.3	1.3	1.3	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.001	0.004	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.58	0.58	0.58	annually	1	1	100%
pH	units	6.5-8.5	7.0	7.4	8.0	fortnightly	26	26	100%
pH	units	6.5-9.2	7.0	7.4	8.0	fortnightly	26	26	100%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	mg/L	80	5.8	5.8	5.8	annually	1	1	100%
Sodium	mg/L	180	5.8	5.8	5.8	annually	1	1	100%
Sulphate	mg/L	250	2.1	2.1	2.1	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	0.006	0.006	0.006	annually	1	-	-
Total Dissolved Solids	mg/L	600	210	210	210	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.2[1]	1.0	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.005	0.008	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.008	0.014	0.017	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	monthly	13	-	-
Chloroform	mg/L	N	0.010	0.015	0.021	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.024	0.037	0.048	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.007	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	LITTLE RIVER 1 July 2011 to 30 June 2012						LOCALITY No. 1A POPULATION 870 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	6	>weekly	65	65	100%
Total Coliforms	orgs/100mL	N	<1	<1	<1	>weekly	65	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	65	65	within standard (actual 100%)
Free Chlorine	mg/L	5	0.01	0.27	0.83	>weekly	65	65	100%
Total Chlorine	mg/L	5	0.02	0.40	0.95	>weekly	65	65	100%
Alkalinity (as $CaCO_3$)	mg/L	N	31	31	31	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.01	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	16.0	16.0	16.0	annually	1	-	-
Chloride	mg/L	250	21	21	21	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	<2	4	fortnightly	26	26	100%
Conductivity	µS/cm	~900	130	155	190	fortnightly	26	26	100%
Copper	mg/L	1	0.020	0.020	0.020	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.74	0.90	1.20	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	45	45	45	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.02	0.06	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	1.6	1.6	1.6	annually	1	-	-
Manganese	mg/L	0.1	<0.001	<0.001	0.003	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.95	1.95	1.95	annually	1	1	100%
pH	units	6.5-8.5	6.4	7.1	8.2	fortnightly	26	25	96.2%
pH	units	6.5-9.2	6.4	7.1	8.2	fortnightly	26	25	96.2%
Potassium	mg/L	N	1.5	1.5	1.5	annually	1	-	-
Silica (SiO_2)	mg/L	80	6.3	6.3	6.3	annually	1	1	100%
Sodium	mg/L	180	11.0	11.0	11.0	annually	1	1	100%
Sulphate	mg/L	250	10.0	10.0	10.0	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	210	210	210	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.3[1]	1.0	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.007	0.010	0.012	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.014	0.020	0.025	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	monthly	13	-	-
Chloroform	mg/L	N	0.019	0.030	0.044	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.041	0.060	0.080	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.006	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	0.005	0.009	0.011	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	MARIBYRNONG 1 July 2011 to 30 June 2012						LOCALITY No. 3A POPULATION 97,419 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	1	220	>weekly	300	300	100%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	301	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	301	301	within standard (actual 100%)
Free Chlorine	mg/L	5	<0.01	0.11	0.56	>weekly	301	301	100%
Total Chlorine	mg/L	5	0.01	0.20	0.76	>weekly	301	301	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	7.1	7.1	7.1	annually	1	-	-
Chloride	mg/L	250	18	18	18	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	2	6	fortnightly	26	26	100%
Conductivity	µS/cm	~900	98	116	130	fortnightly	26	26	100%
Copper	mg/L	1	0.020	0.020	0.020	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.84	0.90	0.98	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	27	27	27	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.03	0.04	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	2.3	2.3	2.3	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.002	0.003	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.77	1.77	1.77	annually	1	1	100%
pH	units	6.5-8.5	7.1	7.2	7.5	fortnightly	26	26	100%
pH	units	6.5-9.2	7.1	7.2	7.5	fortnightly	26	26	100%
Potassium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.8	4.8	4.8	annually	1	1	100%
Sodium	mg/L	180	9.9	9.9	9.9	annually	1	1	100%
Sulphate	mg/L	250	9.6	9.6	9.6	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	28	28	28	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.4[1]	0.8	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.003	0.006	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.008	0.014	0.021	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.016	0.027	0.038	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.034	0.047	0.069	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.010	0.020	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	MOONEE PONDS 1 July 2011 to 30 June 2012						LOCALITY No. 9B POPULATION 61,869 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	1	290	>weekly	222	222	100%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	222	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	222	222	within standard (actual 100%)
Free Chlorine	mg/L	5	0.01	0.11	0.55	>weekly	222	222	100%
Total Chlorine	mg/L	5	0.02	0.21	0.70	>weekly	222	222	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	fortnightly	25	25	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	6.4	6.4	6.4	annually	1	-	-
Chloride	mg/L	250	18	18	18	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	3	6	fortnightly	25	25	100%
Conductivity	µS/cm	~900	94	117	140	fortnightly	25	25	100%
Copper	mg/L	1	0.020	0.020	0.020	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.73	0.89	0.95	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	25	25	25	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.03	0.08	fortnightly	25	25	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	2.1	2.1	2.1	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.002	0.004	fortnightly	25	25	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.77	1.77	1.77	annually	1	1	100%
pH	units	6.5-8.5	7.0	7.2	7.4	fortnightly	25	25	100%
pH	units	6.5-9.2	7.0	7.2	7.4	fortnightly	25	25	100%
Potassium	mg/L	N	1.3	1.3	1.3	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.9	4.9	4.9	annually	1	1	100%
Sodium	mg/L	180	9.5	9.5	9.5	annually	1	1	100%
Sulphate	mg/L	250	8.7	8.7	8.7	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	80	80	80	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.4[1]	0.8	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.004	0.007	0.009	monthly	12	-	-
Dichlorobromomethane	mg/L	N	0.009	0.014	0.019	monthly	12	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	12	-	-
Chloroform	mg/L	N	0.013	0.026	0.040	monthly	12	-	-
Total Trihalomethanes	mg/L	0.25	0.027	0.047	0.065	monthly	12	12	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	12	12	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	12	12	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.007	0.012	monthly	12	12	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	PARKVILLE 1 July 2011 to 30 June 2012						LOCALITY No. 11 POPULATION 99,419 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	390	>weekly	299	299	100%
Total Coliforms	orgs/100mL	N	<1	<1	11	>weekly	300	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	300	300	within standard (actual 100%)
Free Chlorine	mg/L	5	<0.01	0.17	0.55	>weekly	300	300	100%
Total Chlorine	mg/L	5	0.03	0.27	0.67	>weekly	300	300	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	7.2	7.2	7.2	annually	1	-	-
Chloride	mg/L	250	18	18	18	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	3	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	57	109	120	fortnightly	26	26	100%
Copper	mg/L	1	<0.01	<0.01	<0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.78	0.88	0.96	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	27	27	27	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.04	0.15	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	2.3	2.3	2.3	annually	1	-	-
Manganese	mg/L	0.1	0.002	0.003	0.008	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.68	1.68	1.68	annually	1	1	100%
pH	units	6.5-8.5	7.0	7.2	7.3	fortnightly	26	26	100%
pH	units	6.5-9.2	7.0	7.2	7.3	fortnightly	26	26	100%
Potassium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.5	4.5	4.5	annually	1	1	100%
Sodium	mg/L	180	10.0	10.0	10.0	annually	1	1	100%
Sulphate	mg/L	250	10.0	10.0	10.0	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	80	80	80	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.5[1]	1.1	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	0.006	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.008	0.013	0.018	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.019	0.029	0.073	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.034	0.048	0.084	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.008	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	0.007	0.012	0.031	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	RICHMOND 1 July 2011 to 30 June 2012						LOCALITY No. 54 POPULATION 19,493 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	1	81	>weekly	105	105	100%
Total Coliforms	orgs/100mL	N	<1	<1	95	>weekly	105	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	105	105	within standard (actual 100%)
Free Chlorine	mg/L	5	0.01	0.06	0.29	>weekly	105	105	100%
Total Chlorine	mg/L	5	0.02	0.12	0.39	>weekly	105	105	100%
Alkalinity (as $CaCO_3$)	mg/L	N	11	11	11	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.02	0.03	0.05	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	2.8	2.8	2.8	annually	1	-	-
Chloride	mg/L	250	8	8	8	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	4	8	12	fortnightly	26	26	100%
Conductivity	µS/cm	~900	54	61	93	fortnightly	26	26	100%
Copper	mg/L	1	0.02	0.02	0.02	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.74	0.89	0.99	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	11	11	11	annually	1	1	100%
Iron	mg/L	0.3	0.06	0.07	0.12	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Manganese	mg/L	0.1	0.004	0.006	0.016	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.06	1.06	1.06	annually	1	1	100%
pH	units	6.5-8.5	6.9	7.3	7.5	fortnightly	26	26	100%
pH	units	6.5-9.2	6.9	7.3	7.5	fortnightly	26	26	100%
Potassium	mg/L	N	0.8	0.8	0.8	annually	1	-	-
Silica (SiO_2)	mg/L	80	7.4	7.4	7.4	annually	1	1	100%
Sodium	mg/L	180	5.0	5.0	5.0	annually	1	1	100%
Sulphate	mg/L	250	1.2	1.2	1.2	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	92	92	92	annually	1	1	100%
Turbidity	NTU	5[1]	0.2	0.9[1]	2.2	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.006	0.008	0.010	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.049	0.066	0.079	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.056	0.075	0.089	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.022	0.038	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	STRATHMORE 1 July 2011 to 30 June 2012						LOCALITY No. 9A POPULATION 7,557 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	2	760	>weekly	78	78	100%
Total Coliforms	orgs/100mL	N	<1	1	200	>weekly	78	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	78	78	within standard (actual 100%)
Free Chlorine	mg/L	5	0.01	0.06	0.28	>weekly	78	78	100%
Total Chlorine	mg/L	5	0.03	0.14	0.41	>weekly	78	78	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	5.1	5.1	5.1	annually	1	-	-
Chloride	mg/L	250	10	10	10	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	4	10	fortnightly	26	26	100%
Conductivity	µS/cm	~900	63	109	150	fortnightly	26	26	100%
Copper	mg/L	1	<0.01	<0.01	<0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.80	0.90	0.94	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	19	19	19	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.04	0.11	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	1.5	1.5	1.5	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.003	0.025	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.24	1.24	1.24	annually	1	1	100%
pH	units	6.5-8.5	7.1	7.4	7.8	fortnightly	26	26	100%
pH	units	6.5-9.2	7.1	7.4	7.8	fortnightly	26	26	100%
Potassium	mg/L	N	0.9	0.9	0.9	annually	1	-	-
Silica (SiO_2)	mg/L	80	5.9	5.9	5.9	annually	1	1	100%
Sodium	mg/L	180	6.6	6.6	6.6	annually	1	1	100%
Sulphate	mg/L	250	3.8	3.8	3.8	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	60	60	60	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.6[1]	2.9	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.002	0.005	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.009	0.012	0.016	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.012	0.032	0.064	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.028	0.050	0.080	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.007	0.016	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
* Internal City West Water guideline.
** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
N No guideline/standard set for this parameter.
Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
G Geometric means shown for bacterial parameters.
1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	TAYLORS LAKES 1 July 2011 to 30 June 2012						LOCALITY No. 5A POPULATION 47,173 (2006 Census)		
Parameter	**Unit**	**Guideline value** *(ADWG 2011)*	**Concentration or value (all samples)**			**Sampling frequency**	**No. of samples**		**Performance against standard/ guideline**
			Min	**Mean[G]**	**Max**		**Total**	**Passing**	
Total Plate Count (37°C)	orgs/mL	1000*	<1	1	1700	>weekly	168	167	99.4%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	170	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	170	170	within standard (actual 100%)
Free Chlorine	mg/L	5	<0.01	0.34	1.1	>weekly	170	170	100%
Total Chlorine	mg/L	5	0.02	0.48	1.40	>weekly	170	170	100%
Alkalinity (as $CaCO_3$)	mg/L	N	14	14	14	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.04	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	5.0	5.0	5.0	annually	1	-	-
Chloride	mg/L	250	11	11	11	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	6	12	fortnightly	26	26	100%
Conductivity	µS/cm	~900	54	76	100	fortnightly	26	26	100%
Copper	mg/L	1	0.01	0.01	0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.89	0.94	1.10	fortnightly	27	27	100%
Hardness (as $CaCO_3$)	mg/L	200	18	18	18	annually	1	1	100%
Iron	mg/L	0.3	0.04	0.08	0.23	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	1.4	1.4	1.4	annually	1	-	-
Manganese	mg/L	0.1	0.002	0.005	0.011	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.58	0.58	0.58	annually	1	1	100%
pH	units	6.5-8.5	7.0	7.2	7.6	fortnightly	26	26	100%
pH	units	6.5-9.2	7.0	7.2	7.6	fortnightly	26	26	100%
Potassium	mg/L	N	0.8	0.8	0.8	annually	1	-	-
Silica (SiO_2)	mg/L	80	6.1	6.1	6.1	annually	1	1	100%
Sodium	mg/L	180	5.6	5.6	5.6	annually	1	1	100%
Sulphate	mg/L	250	1.9	1.9	1.9	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	0.006	0.006	0.006	annually	1	-	-
Total Dissolved Solids	mg/L	600	60	60	60	annually	1	1	100%
Turbidity	NTU	5[1]	0.2	1.3[1]	2.8	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	<0.001	0.001	0.003	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.004	0.007	0.011	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.012	0.033	0.067	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.018	0.041	0.079	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	0.006	0.011	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	0.005	0.019	0.039	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	TULLAMARINE 1 July 2011 to 30 June 2012						LOCALITY No. 7A POPULATION 9,467 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	1	1400	>weekly	79	78	98.7%
Total Coliforms	orgs/100mL	N	<1	<1	200	>weekly	79	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	79	79	within standard (actual 100%)
Free Chlorine	mg/L	5	0.01	0.28	0.67	>weekly	79	79	100%
Total Chlorine	mg/L	5	0.07	0.42	0.87	>weekly	79	79	100%
Alkalinity (as $CaCO_3$)	mg/L	N	14	14	14	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.01	0.03	fortnightly	27	27	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	3.5	3.5	3.5	annually	1	-	-
Chloride	mg/L	250	10	10	10	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	3	10	fortnightly	27	27	100%
Conductivity	µS/cm	~900	73	104	150	fortnightly	27	27	100%
Copper	mg/L	1	0.01	0.01	0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.85	0.91	1.00	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	14	14	14	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.05	0.20	fortnightly	27	27	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	1.3	1.3	1.3	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.003	0.015	fortnightly	27	27	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	0.58	0.58	0.58	annually	1	1	100%
pH	units	6.5-8.5	6.9	7.3	7.8	fortnightly	27	27	100%
pH	units	6.5-9.2	6.9	7.3	7.8	fortnightly	27	27	100%
Potassium	mg/L	N	1.1	1.1	1.1	annually	1	-	-
Silica (SiO_2)	mg/L	80	7.1	7.1	7.1	annually	1	1	100%
Sodium	mg/L	180	6.2	6.2	6.2	annually	1	1	100%
Sulphate	mg/L	250	2.6	2.6	2.6	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	140	140	140	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	1.1[1]	4.9	weekly	53	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.001	0.006	0.008	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.004	0.008	0.018	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.009	0.016	0.036	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.015	0.029	0.048	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.008	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.008	0.016	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
* Internal City West Water guideline.
** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
N No guideline/standard set for this parameter.
Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
G Geometric means shown for bacterial parameters.
1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	WERRIBEE 1 July 2011 to 30 June 2012						LOCALITY No. 1 POPULATION 91,957 (2006 Census)		
Parameter	Unit	Guideline value (ADWG 2011)	Concentration or value (all samples)			Sampling frequency	No. of samples		Performance against standard/ guideline
			Min	Mean[G]	Max		Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	1000	>weekly	287	287	100%
Total Coliforms	orgs/100mL	N	<1	<1	4	>weekly	288	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	1	>weekly	288	287	within standard (actual 99.7%)
Free Chlorine	mg/L	5	0.01	0.17	0.61	>weekly	288	288	100%
Total Chlorine	mg/L	5	0.02	0.28	0.67	>weekly	288	288	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	7.4	7.4	7.4	annually	1	-	-
Chloride	mg/L	250	20	20	20	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	2	4	fortnightly	26	26	100%
Conductivity	µS/cm	~900	100	133	150	fortnightly	26	26	100%
Copper	mg/L	1	<0.01	<0.01	<0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.79	0.89	1.00	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	29	29	29	annually	1	1	100%
Iron	mg/L	0.3	<0.02	<0.02	0.06	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	2.5	2.5	2.5	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.001	0.003	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.86	1.86	1.86	annually	1	1	100%
pH	units	6.5-8.5	6.9	7.7	9.1	fortnightly	26	24	92.3%
pH	units	6.5-9.2	6.9	7.7	9.1	fortnightly	26	26	100%
Potassium	mg/L	N	1.5	1.5	1.5	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.5	4.5	4.5	annually	1	1	100%
Sodium	mg/L	180	11.0	11.0	11.0	annually	1	1	100%
Sulphate	mg/L	250	11.0	11.0	11.0	annually	1	1	100%
Total Organic Carbon	mg/L	N	3.0	3.0	3.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	100	100	100	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.3[1]	0.9	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.007	0.009	0.011	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.012	0.018	0.022	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	monthly	13	-	-
Chloroform	mg/L	N	0.014	0.025	0.034	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.034	0.053	0.065	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.007	0.010	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	WERRIBEE SOUTH 1 July 2011 to 30 June 2012						LOCALITY No. 2A POPULATION 1,649 (2006 Census)		
Parameter	**Unit**	**Guideline value** *(ADWG 2011)*	**Concentration or value (all samples)**			**Sampling frequency**	**No. of samples**		**Performance against standard/ guideline**
			Min	**Mean[G]**	**Max**		**Total**	**Passing**	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	12	>weekly	65	65	100%
Total Coliforms	orgs/100mL	N	<1	<1	1	>weekly	65	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	65	65	within standard (actual 100%)
Free Chlorine	mg/L	5	0.01	0.22	0.60	>weekly	65	65	100%
Total Chlorine	mg/L	5	0.03	0.32	0.76	>weekly	65	65	100%
Alkalinity (as $CaCO_3$)	mg/L	N	14	14	14	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.01	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Cadmium	mg/L	0.002	<0.0002	<0.0002	<0.0002	annually	1	1	100%
Calcium	mg/L	N	6.7	6.7	6.7	annually	1	-	-
Chloride	mg/L	250	20	20	20	annually	1	1	100%
Chromium	mg/L	0.05	<0.001	<0.001	<0.001	annually	1	1	100%
Colour	Pt/Co	25**	<2	2	4	fortnightly	26	26	100%
Conductivity	µS/cm	~900	100	127	140	fortnightly	26	26	100%
Copper	mg/L	1	<0.002	<0.002	<0.002	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.84	0.89	0.94	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	24	24	24	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.02	0.07	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.001	<0.001	<0.001	annually	1	1	100%
Magnesium	mg/L	N	1.8	1.8	1.8	annually	1	-	-
Manganese	mg/L	0.1	<0.001	0.001	0.006	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.0001	<0.0001	<0.0001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.77	1.77	1.77	annually	1	1	100%
pH	units	6.5-8.5	7.2	7.6	8.4	fortnightly	26	26	100%
pH	units	6.5-9.2	7.2	7.6	8.4	fortnightly	26	26	100%
Potassium	mg/L	N	1.5	1.5	1.5	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.6	4.6	4.6	annually	1	1	100%
Sodium	mg/L	180	11.0	11.0	11.0	annually	1	1	100%
Sulphate	mg/L	250	11.0	11.0	11.0	annually	1	1	100%
Total Organic Carbon	mg/L	N	2.0	2.0	2.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	76	76	76	annually	1	1	100%
Turbidity	NTU	5[1]	<0.1	0.3[1]	1.0	weekly	52	-	within standard
Zinc	mg/L	3	<0.001	<0.001	<0.001	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.004	0.008	0.012	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.010	0.017	0.021	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	monthly	13	-	-
Chloroform	mg/L	N	0.021	0.030	0.040	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.038	0.057	0.066	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	0.007	0.010	0.014	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	0.100	0.100	0.100	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

WATER SAMPLING LOCALITY FOR PERIOD	WILLIAMSTOWN 1 July 2011 to 30 June 2012						LOCALITY No. 3B POPULATION 39,625 (2006 Census)		
Parameter	**Unit**	**Guideline value** *(ADWG 2011)*	**Concentration or value (all samples)**			**Sampling frequency**	**No. of samples**		**Performance against standard/ guideline**
			Min	**Mean[G]**	**Max**		**Total**	**Passing**	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	2400	>weekly	144	143	99%
Total Coliforms	orgs/100mL	N	<1	<1	<1	>weekly	144	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	<1	>weekly	144	144	within standard (actual 100%)
Free Chlorine	mg/L	5	0.01	0.15	0.41	>weekly	144	144	100%
Total Chlorine	mg/L	5	0.02	0.25	0.53	>weekly	144	144	100%
Alkalinity (as $CaCO_3$)	mg/L	N	12	12	12	annually	1	-	-
Aluminium (acid soluble)	mg/L	0.2	0.020	0.02	0.03	fortnightly	26	26	100%
Arsenic	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Cadmium	mg/L	0.002	<0.002	<0.002	<0.002	annually	1	1	100%
Calcium	mg/L	N	6.7	6.7	6.7	annually	1	-	-
Chloride	mg/L	250	20	20	20	annually	1	1	100%
Chromium	mg/L	0.05	<0.01	<0.01	<0.01	annually	1	1	100%
Colour	Pt/Co	25**	<2	2	6	fortnightly	26	26	100%
Conductivity	µS/cm	~900	100	117	130	fortnightly	26	26	100%
Copper	mg/L	1	<0.01	<0.01	<0.01	annually	1	1	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	annually	1	1	100%
Fluoride	mg/L	1.5	0.80	0.90	0.95	fortnightly	28	28	100%
Hardness (as $CaCO_3$)	mg/L	200	26	26	26	annually	1	1	100%
Iron	mg/L	0.3	<0.02	0.02	0.05	fortnightly	26	26	100%
Lead	mg/L	0.01	<0.01	<0.01	<0.01	annually	1	1	100%
Magnesium	mg/L	N	2.3	2.3	2.3	annually	1	-	-
Manganese	mg/L	0.1	0.001	0.002	0.007	fortnightly	26	26	100%
Mercury	mg/L	0.001	<0.001	<0.001	<0.001	annually	1	1	100%
Nitrate (NO_3)	mg/L	50	1.86	1.86	1.86	annually	1	1	100%
pH	units	6.5-8.5	6.6	7.2	7.9	fortnightly	26	26	100%
pH	units	6.5-9.2	6.6	7.2	7.9	fortnightly	26	26	100%
Potassium	mg/L	N	1.5	1.5	1.5	annually	1	-	-
Silica (SiO_2)	mg/L	80	4.7	4.7	4.7	annually	1	1	100%
Sodium	mg/L	180	9.8	9.8	9.8	annually	1	1	100%
Sulphate	mg/L	250	9.7	9.7	9.7	annually	1	1	100%
Total Organic Carbon	mg/L	N	3.0	3.0	3.0	annually	1	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	<0.005	annually	1	-	-
Total Dissolved Solids	mg/L	600	80	80	80	annually	1	1	100%
Turbidity	NTU	5[1]	0.1	0.3[1]	0.6	weekly	52	-	within standard
Zinc	mg/L	3	<0.01	<0.01	<0.01	annually	1	1	100%
Dibromochloromethane	mg/L	N	0.004	0.006	0.009	monthly	13	-	-
Dichlorobromomethane	mg/L	N	0.009	0.014	0.020	monthly	13	-	-
Bromoform	mg/L	N	<0.001	<0.001	<0.001	monthly	13	-	-
Chloroform	mg/L	N	0.016	0.027	0.035	monthly	13	-	-
Total Trihalomethanes	mg/L	0.25	0.037	0.048	0.064	monthly	13	13	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	monthly	13	13	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	<0.005	monthly	13	13	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.011	0.019	monthly	13	13	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	annually	1	1	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	<0.1	annually	1	1	100%

Notes:
- * Internal City West Water guideline.
- ** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
- N No guideline/standard set for this parameter.
- # Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
- G Geometric means shown for bacterial parameters.
- 1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

FOR PERIOD		ALL WATER SAMPLING LOCALITIES 1 July 2011 to 30 June 2012			POPULATION 695,209 (2006 Census)		
Parameter	Unit	Guideline value *(ADWG 2011)*	Concentration or value (all samples)			No. of samples		Performance against standard/guideline
			Min	Mean[G]	Max	Total	Passing	
Total Plate Count (37°C)	orgs/mL	1000*	<1	<1	2,400	2568	2564	99.9%
Total Coliforms	orgs/100mL	N	<1	<1	200	2573	-	-
E. coli	orgs/100mL	98%<1#	<1	<1	1	2573	2572	within standard (actual 99.9%)
Free Chlorine	mg/L	5	<0.01	0.15	1.1	2573	2573	100%
Total Chlorine	mg/L	5	0.01	0.26	1.40	2573	2573	100%
Alkalinity (as $CaCO_3$)	mg/L	N	11	14	31	15	-	-
Aluminium (acid soluble)	mg/L	0.2	<0.01	0.02	0.05	390	390	100%
Arsenic	mg/L	0.01	<0.001	<0.01	<0.01	15	15	100%
Cadmium	mg/L	0.002	<0.0002	<0.002	<0.002	15	15	100%
Calcium	mg/L	N	2.8	6.7	16.0	15	-	-
Chloride	mg/L	250	8.0	15.6	21.0	15	15	100%
Chromium	mg/L	0.05	<0.001	<0.01	<0.01	15	15	100%
Colour	Pt/Co	25**	<2	3	12	390	390	100%
Conductivity	µS/cm	~900	54	113	190	390	390	100%
Copper	mg/L	1	<0.001	0.010	0.020	15	15	100%
Cyanide	mg/L	0.08	<0.005	<0.005	<0.005	15	15	100%
Dissolved Oxygen	mg/L	N	8.0	9.7	11.4	26	-	-
Fluoride	mg/L	1.5	0.64	0.90	1.20	416	416	100%
Hardness (as $CaCO_3$)	mg/L	200	11	24	45	15	15	100%
Iron	mg/L	0.3	<0.02	0.04	0.23	390	390	100%
Lead	mg/L	0.01	<0.001	<0.01	<0.01	15	15	100%
Magnesium	mg/L	N	0.9	1.8	2.5	15	-	-
Manganese	mg/L	0.1	<0.001	0.003	0.025	390	390	100%
Mercury	mg/L	0.001	<0.0001	<0.001	<0.001	15	15	100%
Nitrate (NO_3)	mg/L	50	0.58	1.40	1.95	15	15	100%
pH	units	6.5-8.5	6.4	7.3	9.1	390	385	98.7%
pH	units	6.5-9.2	6.4	7.3	9.1	390	389	99.7%
Potassium	mg/L	N	0.8	1.2	1.5	15	-	-
Silica (SiO_2)	mg/L	80	4.5	5.5	7.4	15	15	100%
Sodium	mg/L	180	5.0	8.5	11.0	15	15	100%
Sulphate	mg/L	250	1.2	6.9	11.0	15	15	100%
Temperature	oC	N	12.0	17.2	21.5	26	-	-
Total Organic Carbon	mg/L	N	2.0	2.1	3.0	15	-	-
Total Phosphorus	mg/L	N	<0.005	<0.005	0.012	15	-	-
Total Dissolved Solids	mg/L	600	28	101	210	15	15	100%
Turbidity	NTU	5[1]	<0.1	0.5[1]	4.9	781	-	within standard
Zinc	mg/L	3	<0.001	<0.01	<0.01	15	15	100%
Dibromochloromethane	mg/L	N	<0.001	0.006	0.012	194	-	-
Dichlorobromomethane	mg/L	N	0.004	0.013	0.025	194	-	-
Bromoform	mg/L	N	<0.001	<0.001	0.001	194	-	-
Chloroform	mg/L	N	0.009	0.029	0.081	194	-	-
Total Trihalomethanes	mg/L	0.25	0.015	0.049	0.093	194	194	100%
Chloroacetic acid	mg/L	0.15	<0.005	<0.005	<0.005	194	194	100%
Dichloroacetic acid	mg/L	0.1	<0.005	<0.005	0.011	194	194	100%
Trichloroacetic acid	mg/L	0.1	<0.005	0.010	0.044	194	194	100%
Bromate	mg/L	0.02	<0.01	<0.01	<0.01	15	15	100%
Formaldehyde	mg/L	0.5	<0.1	<0.1	0.2	15	15	100%

Notes:
* Internal City West Water guideline.
** Guideline set for 'True Colour' (15 PCU) however 'Apparent Colour' is measured (with a benchmark guideline of 25 PCU).
N No guideline/standard set for this parameter.
Victorian standard: 98% of samples must not contain any *E.coli*/100mL.
G Geometric means shown for bacterial parameters.
1 Victorian standard: 95% upper confidence limit of mean (shown) less than or equal to 5 NTU.

APPENDIX B. Spatial and time-based water quality summaries

Table B.1 *E. coli* performance in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

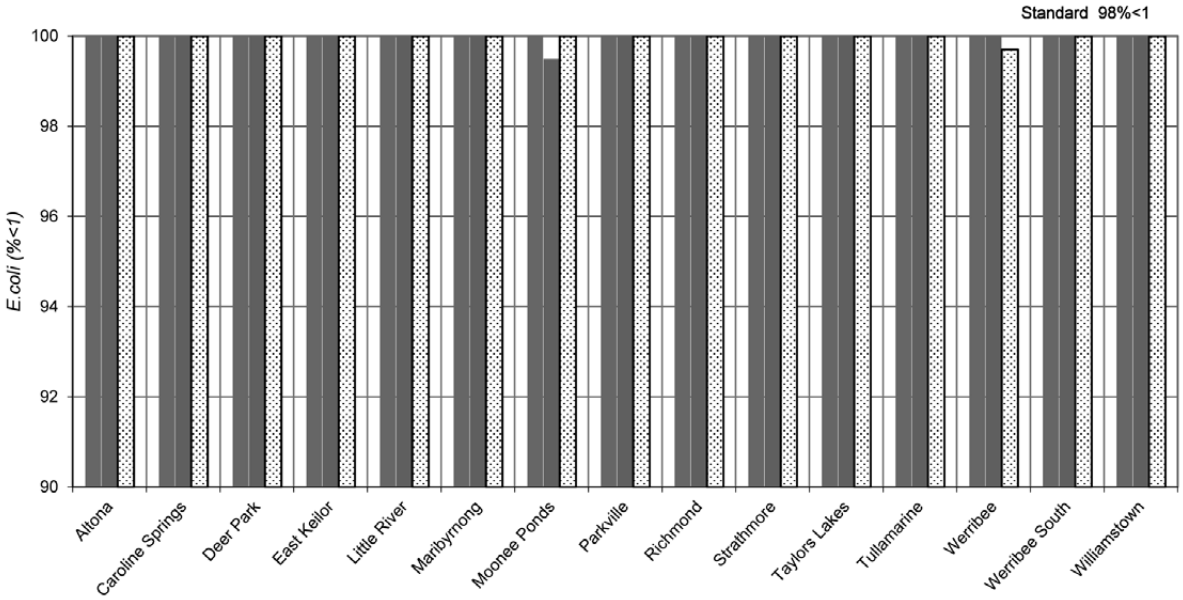


Figure B.2 Annual average free chlorine concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

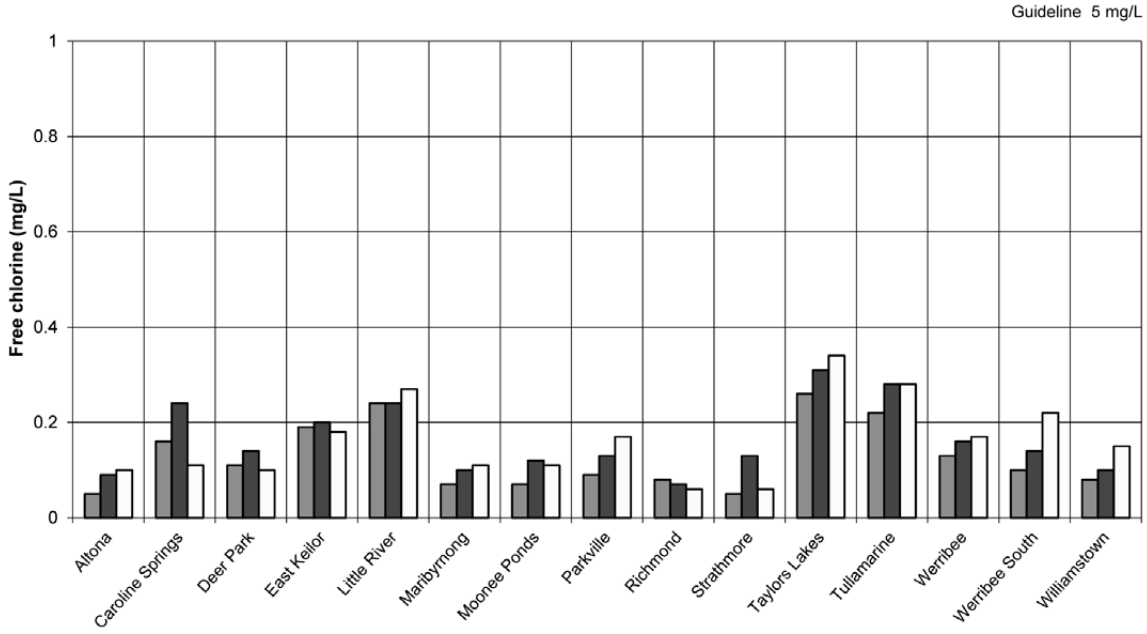


Figure B.3 Average aluminium concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

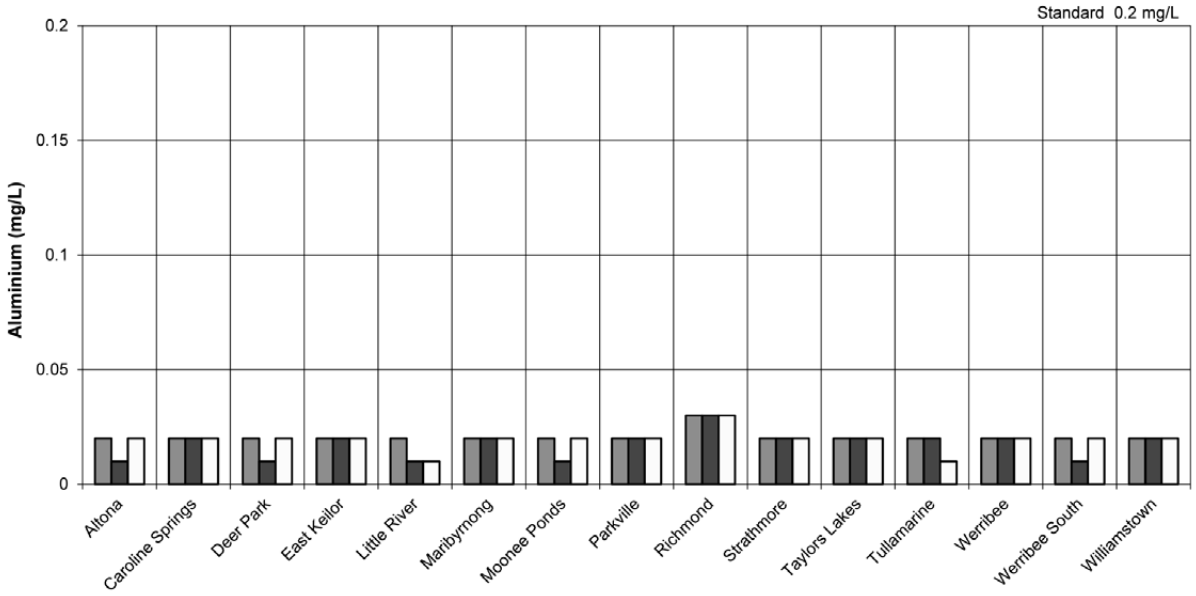


Figure B.4 Chloride concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

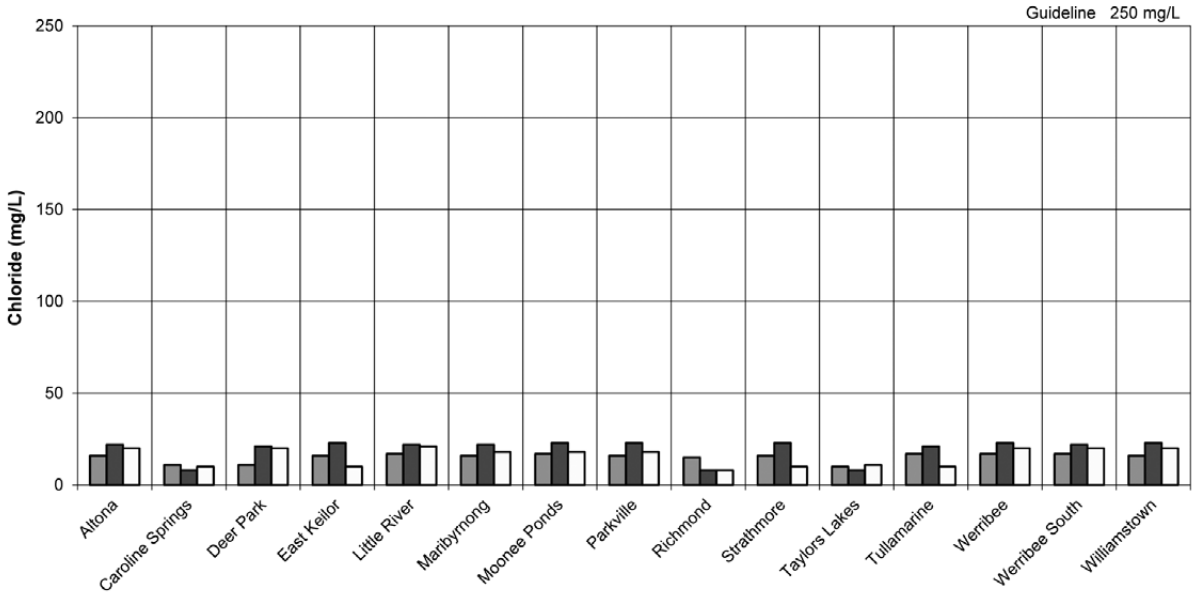


Figure B.5 Average apparent colour levels in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

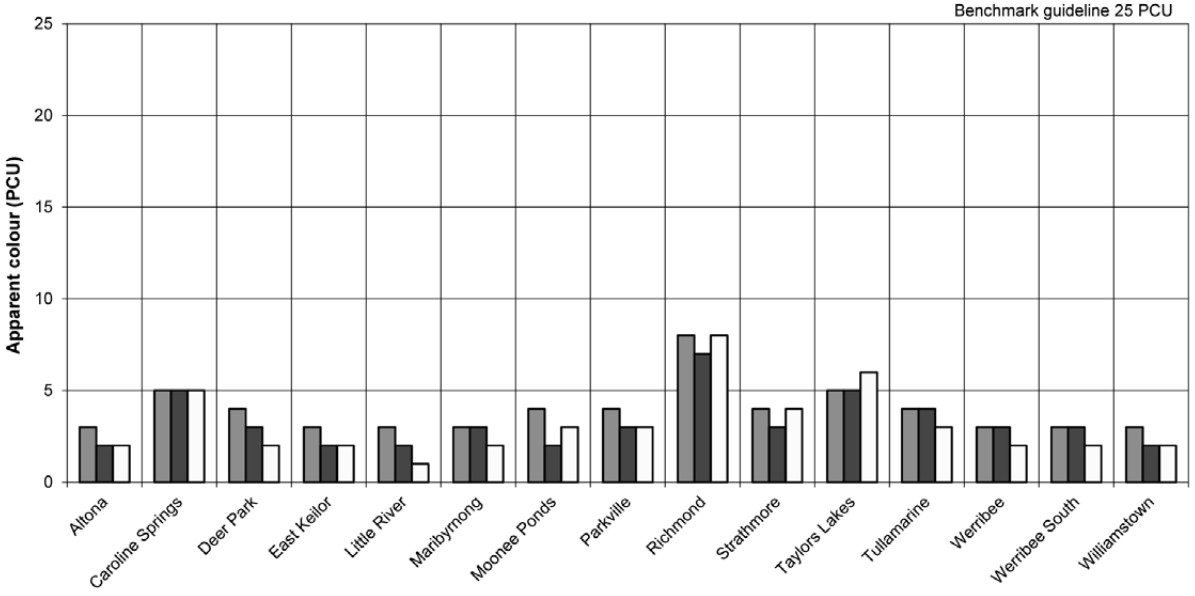


Figure B.6 Copper concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

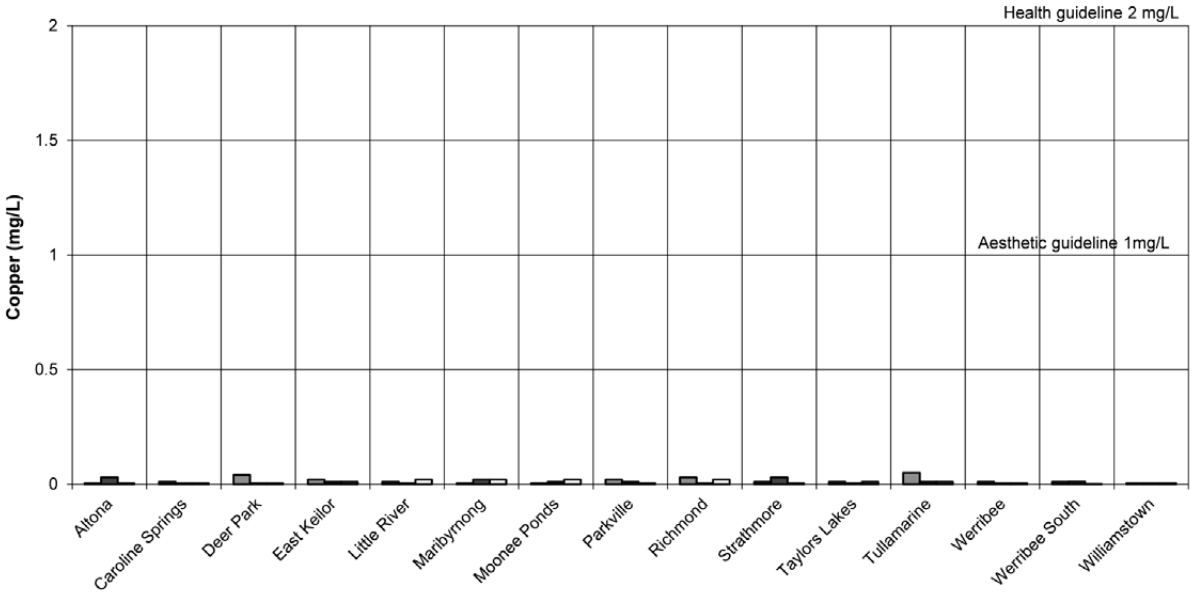


Figure B.7 Average electrical conductivity levels in water sampling localities
(between 2009/2010 and 2011/2012, from left to right within each locality)

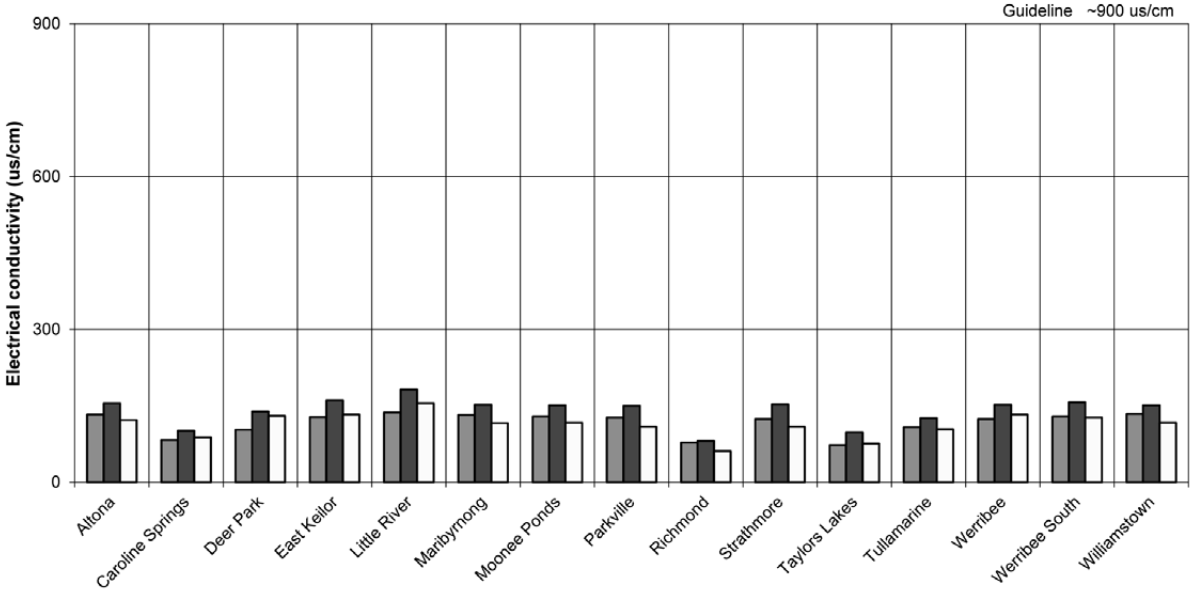


Figure B.8 Average fluoride concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

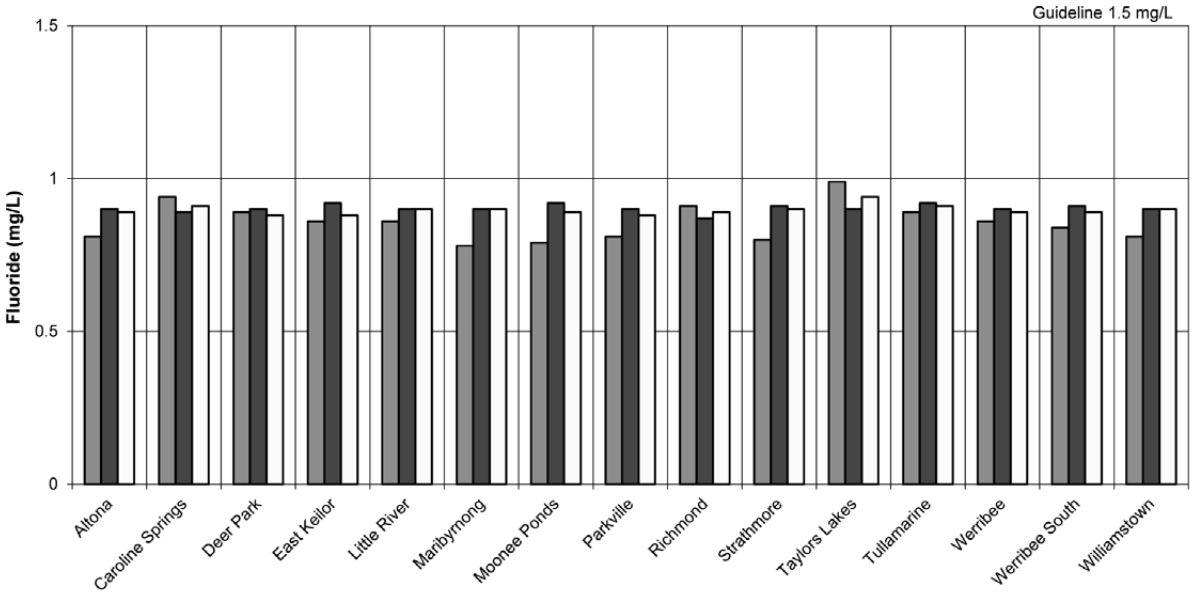


Figure B.9 Hardness concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

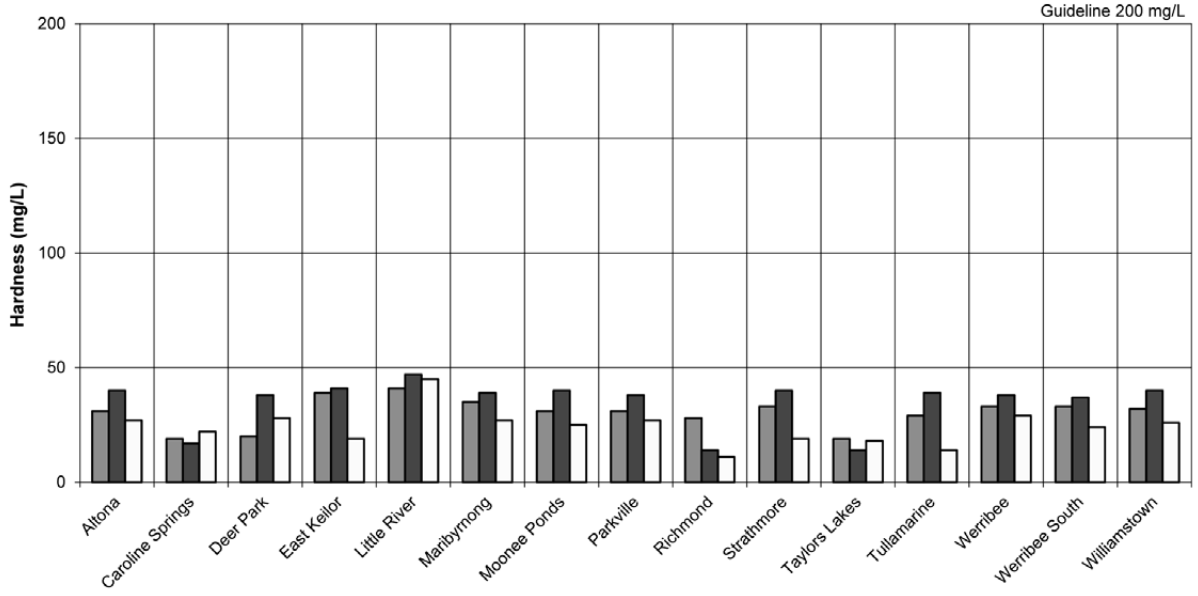


Figure B.10 Average iron concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

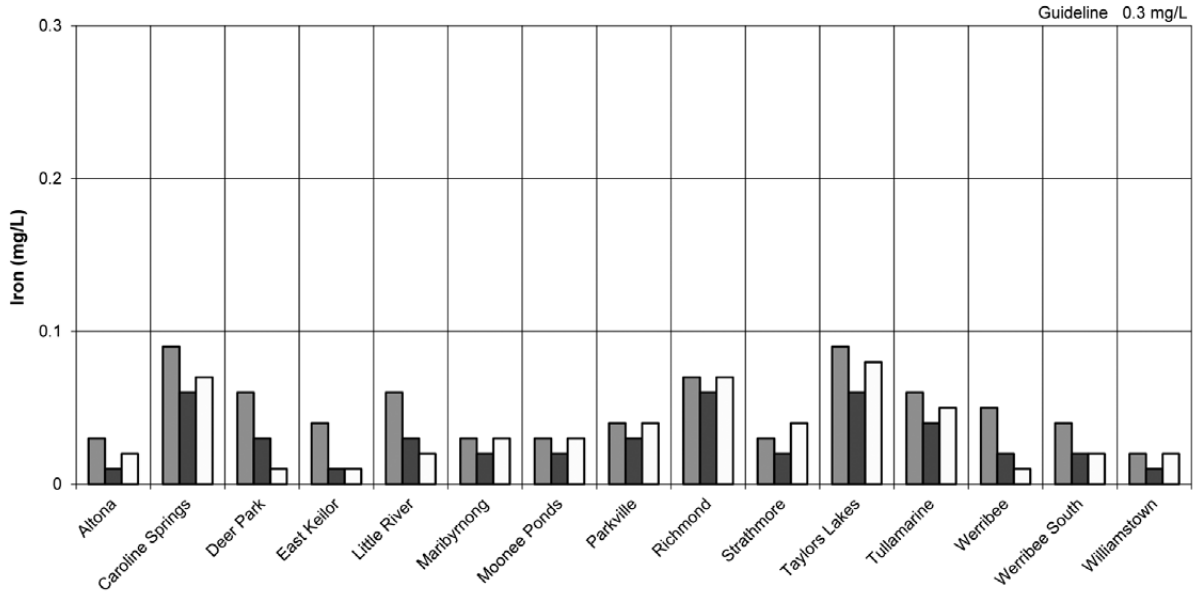


Figure B.11 Average manganese concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

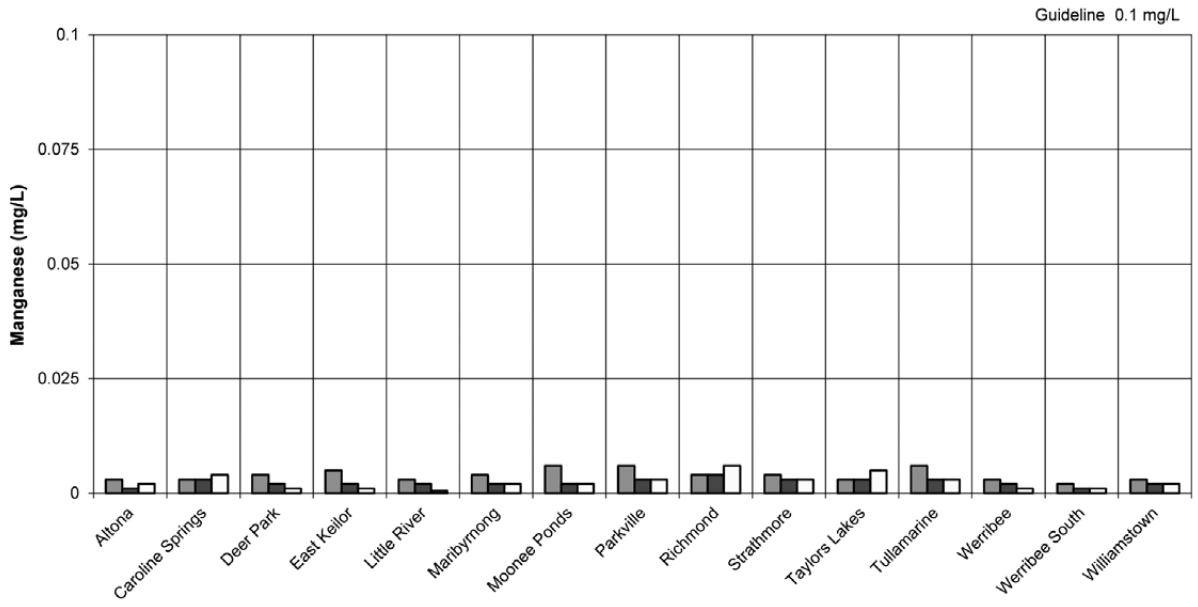


Figure B.12 Nitrate concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

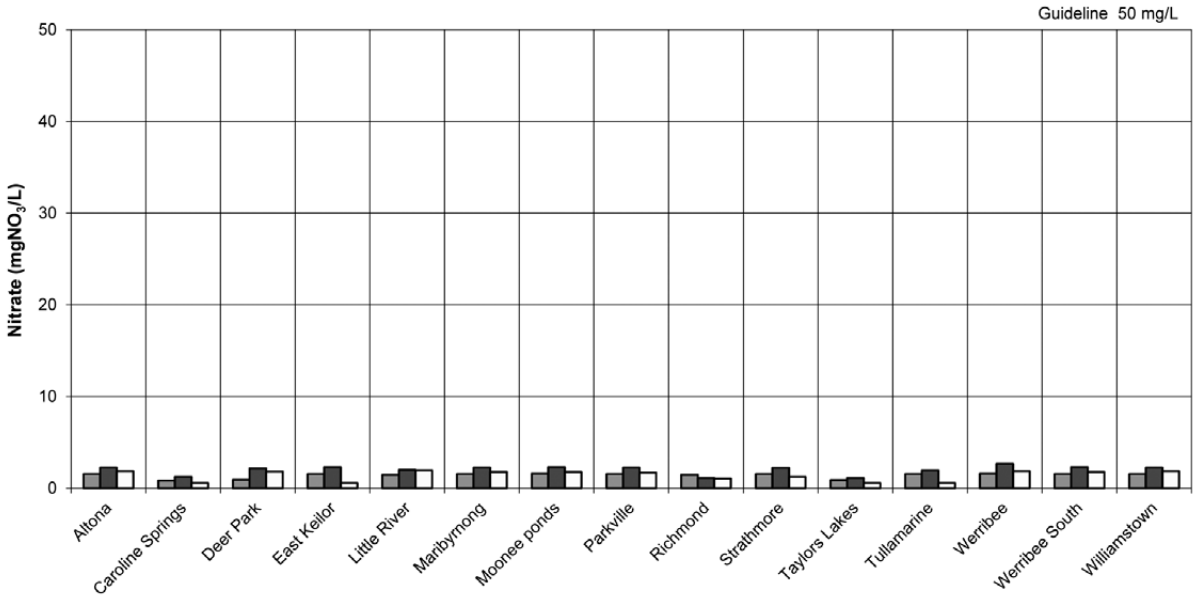


Figure B.13 Average pH values in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

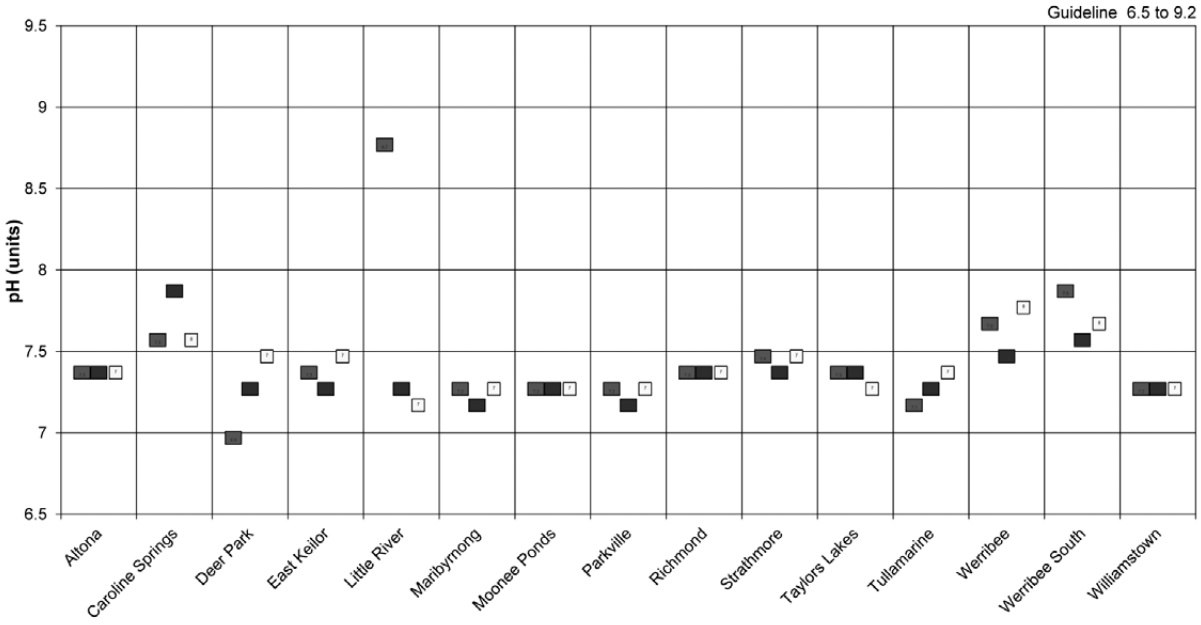


Figure B.14 Sodium concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

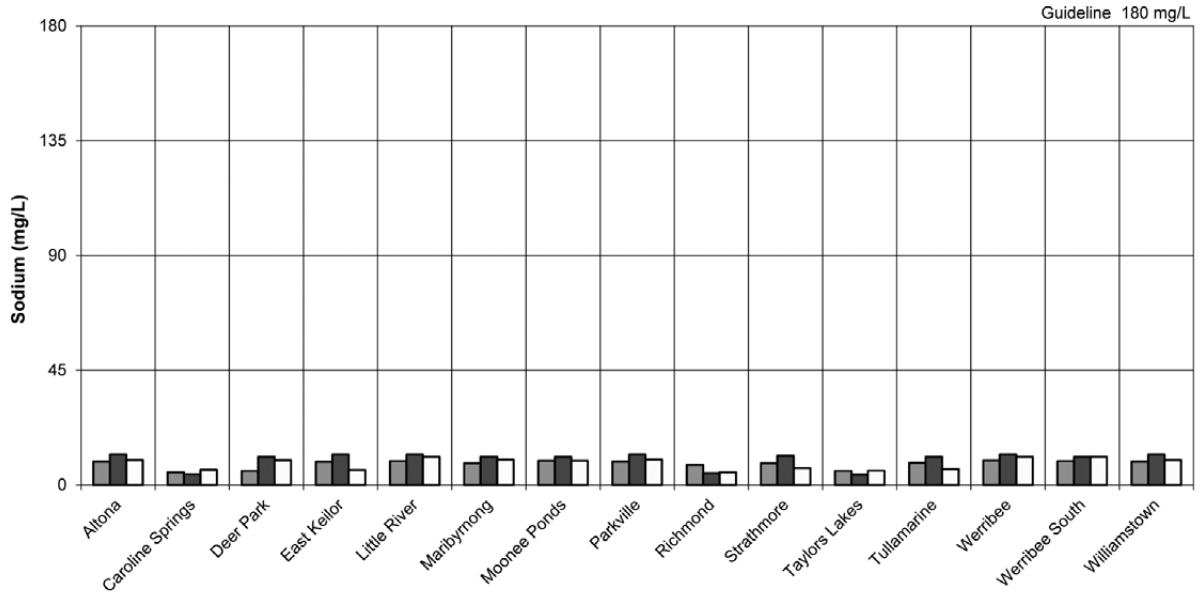


Figure B.15 Summary turbidity levels in water sampling zones
(between 2009-2010 and 2011-2012, from left to right within each locality)

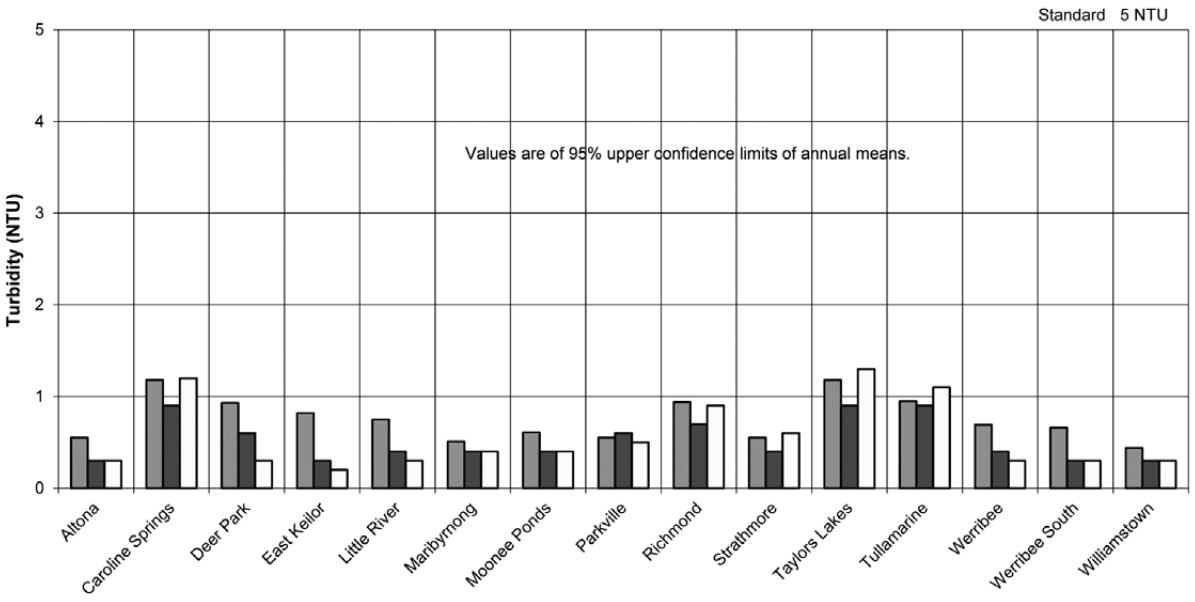


Figure B.16 Sulphate concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)

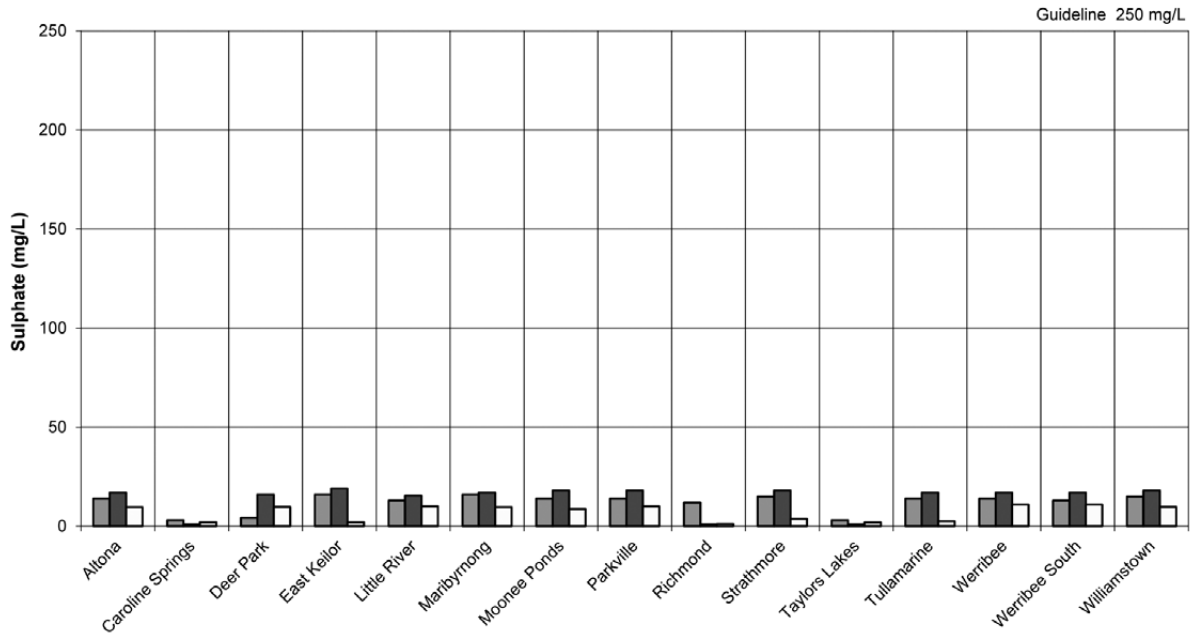
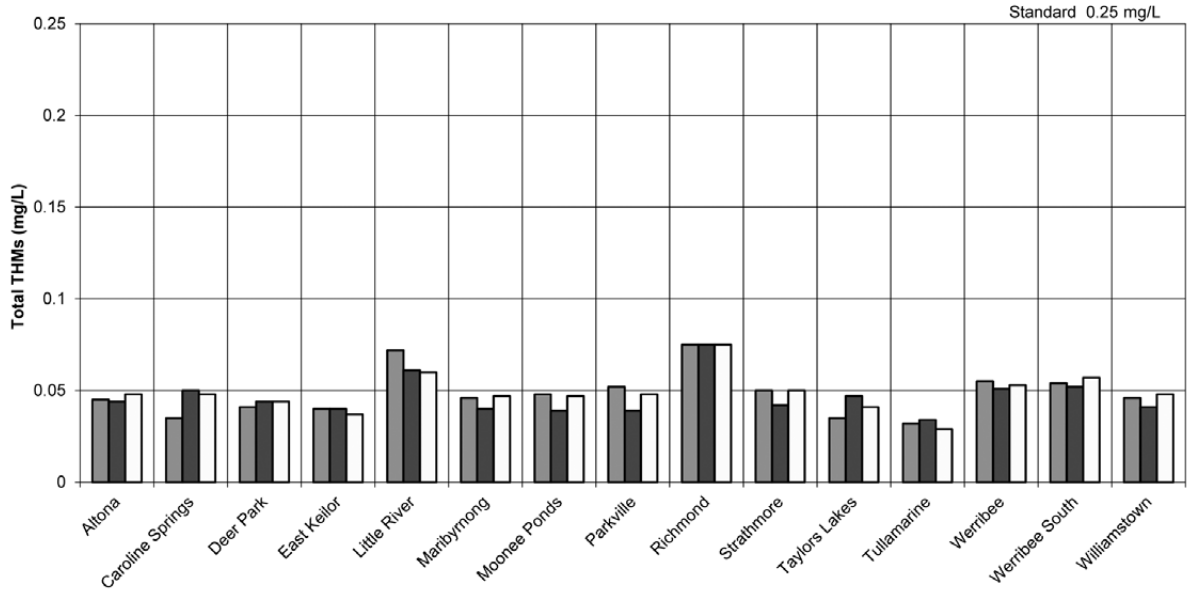


Figure B.17 Average total trihalomethane concentrations in water sampling localities
(between 2009-2010 and 2011-2012, from left to right within each locality)



APPENDIX C. 2012 Risk Management Plan Regulatory Audit Certificate and opportunities for improvement

Schedule 1

Regulation 8

Safe Drinking Water Regulations 2005

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 57

Audit period: 17th December 2009 to 30th April 2012

To: Ms Anne Barker
Managing Director
City West Water Limited
Locked Bag 350
Sunshine Vic 3020

Australian Business Number (ABN): 70 066 902 467

I, Dr.Pararajasegram (Dharma) Dharmabalan, after conducting a risk management plan audit of the water supplied by City West Water Limited, am of the opinion that—

City West Water Limited has complied with the obligations imposed by section 7(1) of the ***Safe Drinking Water Act* 2003** during the audit period.

Signature of approved auditor: _____

Dr.P. (Dharma) Dharmabalan

Date: 30th April 2012

RABQSA International Certified Auditor
Drinking Water QMS Scheme
Certificate Number 14555

2012 drinking water risk management plan audit - opportunities for improvement

ADWG Element / Component / Action	Opportunity for Improvement	Comments / Corrective Actions Undertaken
E2 / C2.1 / A2.1.4	City West Water should initiate additional integrity checks on their key assets as appropriate when conditions change and keep records of reviews and field audits of the condition of water supply assets.	City West Water undertakes biannual inspections of water supply tanks and associated fixtures. This work is programmed by, and recorded in City West Water's electronic job scheduling and dispatch system. Extent of inspections will take into account asset condition and environment. Inspection details have commenced to be included in the records.
E2 / C2.3 / A2.3.4	City West Water should be provided with data on the performance of selected water quality parameters on water leaving the Melbourne Water's Winneke Treatment Plant e.g Turbidity, Ct, UV254, and Microbial).	City West Water will negotiate with Melbourne Water the availability and presentability of water quality data with respect to the Winneke Treatment Plant. This item to be formally raised at the next Bulk Water Supply Agreement meeting in August 2012.
E3 / C3.1 / A3.1.1	City West Water should review performance data for individual water filters at Melbourne Water's Winneke Treatment Plant. This is primarily to assess risk with respect to protozoa.	City West Water will review and assess Winneke Treatment Plant filter performance data when this becomes available. This item to be formally raised at the next Bulk Water Supply Agreement meeting in August 2012.
E4 / C4.2 / A4.2.1	Include Winneke Treatment Plant performance in Melbourne Water's monthly reports.	City West Water will endeavour to have the monthly reports modified. City West Water will assess and document microbial (including protozoan) risks associated with Melbourne Water's Winneke Treatment Plant. This item to be formally raised at the next Bulk Water Supply Agreement meeting in August 2012.
E6 / C6.1 / A6.1.1	Improve processes for publication of water quality information to prevent data errors.	Improved processes have been implemented.
E9 / C9.2 / A9.2.1	Improve identification of source water origin to water sampling localities.	This is currently being addressed with Melbourne Water.
E10 / C10.2 / A10.2.1	Allocate appropriate staff responsibilities to prevent data errors in Annual Drinking Water Quality report.	Appropriate staff responsibilities have been allocated.

Notes

Notes

Notes

City West Water

City West Water
ABN 70 066 902 467
247-251 St Albans Road
Locked Bag 350
Sunshine Vic 3020

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